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BATS FROM MOUNT WHITNEY, CALIFORNIA

BY GLOVER M. ALLEN

In July, 1915, it was the writer's privilege to accompany Prof. Theodore Lyman on a brief expedition to Mount Whitney, the highest peak in the United States outside of Alaska, lying near the southern end of the Sierra Nevada of California. Starting from Lone Pine, at the eastern foot, we ascended to the upper limit of timber and there camped for a week or more by the outlet of a mountain lake, at an altitude of about 11,000 feet. In successive evenings, four species of bats were secured at this camp, one of which proves to be an unsuspected new species, apparently related to *Myotis lucifugus*. The following brief notes are further offered as amplifying slightly the distributional data lately published by Mrs. Hilda W. Grinnell in her excellent Synopsis of the Bats of California (Univ. of Calif. Publ., zool., 1918, vol. 17, p. 223–404, pl. 14–24). All the specimens obtained were, through Doctor Lyman's generosity, given to the Museum of Comparative Zoölogy, at Cambridge, to the authorities of which I am indebted for permission to publish this report.

Myotis yumanensis sociabilis H. W. Grinnell

TEJON BAT

This form of the Yuma bat is characterized by Mrs. Grinnell as intermediate in color between typical *yumanensis* and its subspecies *saturatus*. She indicates its range as the "semi-arid Transition and Sonoran zones in [southern] California west and north of the southeastern deserts." On July 16, a bat which seems referable to this race was shot just above our camp at 11,000 feet on Mount Whitney,

the highest recorded altitude for it in the state (though Mrs. Grinnell records one from 8500 feet in the San Bernardino Mountains). A second individual was captured at Lone Pine at the foot of the mountain, a few days later. Both are males.

In her Synopsis of the Bats of California, Mrs. Grinnell cites but a single specimen of typical *yumanensis* from that State, namely, one from Carroll Creek, Inyo County. In view of the implied distribution of this form east of the desert divides, I at first was inclined to refer the above specimens to it, but thanks to the generous interest of Mr. A. Brazier Howell, of Covina, California, I have been able to compare them with typical *yumanensis* from near Potholes, a short distance from Fort Yuma, Imperial County, the type locality. The skin from Mount Whitney is noticeably darker, with slightly darker membranes, thus inclining toward the race *saturatus*. There is a very notable difference, apparent in both skin and alcoholic, by which the two specimens from Inyo County are further distinguished, namely, the much larger thumbs with their longer, more curving claw. The thumb of typical *yumanensis* is nearly 1.5 to 2 mm. shorter, a difference very apparent on comparison. Although direct comparison with typical specimens of *sociabilis* has not been made, it is clear that our Mount Whitney and Lone Pine examples cannot be referred to *yumanensis* proper, and hence doubtless represent *sociabilis*, the subspecies intermediate in position between it and *saturatus*.

Myotis albicinctus sp. nov.

WHITE-EDGED BAT

Type.—An adult male, skin (and skull, temporarily mislaid), 11747 Mus. Comp. Zoöl., from 11,000 feet altitude at the upper limit of timber, Mount Whitney, California, July 14, 1915.

Characters.—A bat of the size and proportions of *M. lucifugus* but very pallid, with conspicuous white border to the wing membranes, broadest between the fifth finger and tarsus. Skull like that of *M. lucifugus* but the two small anterior premolars of the upper jaw relatively larger, the first drawn decidedly within the posterior border of the canine, by which it is thus partly concealed in side view.

Color.—The type is a very pale clear sandy above, nearest the "pale buff" of Ridgway's 1912 Nomenclature of Colors, very slightly paler or grayer on the head; below clear and contrasting white, the gray bases of the hairs showing through on the throat. The basal portion of the fur of both surfaces is dark slaty, paler or grayish at the throat.

The ears are blackish as is also the greater part of the wing membranes. The posterior edge of the wing from the tip of the longest (third) digit to the ankle

has a pronounced white border, narrow at the tip of the wing and not sharply defined, but from the tip of the fifth finger to the tarsus, it is broad (1.5 mm. in the dry skin), very sharply and contrastingly marked off. The uropatagium is dusky on the basal third, passing into whitish on the distal two thirds, with a clearer white edge.

Membranes.—The ears and tragus are practically as in *M. lucifugus*, and minutely haired. The fur of the body extends very slightly on to the base of the uropatagium, but is sharply limited at the sides of the body. The foot is relatively large as in *M. lucifugus*, the calcar long and slender, unkeeled, ending in a minute projecting lobule. The extreme tip of the tail is free.

Skull.—Unfortunately the skull of the type has been temporarily mislaid. The skull of a second specimen, however, (1023, coll. of A. B. Howell) from Mono County, California corresponds closely in size and shape with that of *M. lucifugus altipetens*, but is at once distinguished by the relatively larger and blunter first and second upper premolars (pm^2, pm^3). In *M. lucifugus* and its western race both are fully visible in side view, and stand practically in the line of the tooth row, the posterior tooth with perhaps one half the cross-section area of the anterior. In *M. albicinctus*, however, the larger anterior tooth is distinctly drawn in from the tooth row and shifted slightly forward, so that the anterior third of its base is nearly concealed by the base of the canine when viewed in profile. The second premolar is distinctly larger relatively, in cross section, than in *M. lucifugus*. As in the latter, and in contrast to *M. subulatus*, the lower incisors are but very slightly imbricate.

Measurements.—The type measured before skinning: total length, 86 mm.; tail, 42.5; hind foot, 9; ear from meatus, 15; forearm, 37; tibia (dry), 16. The specimen collected by Mr. A. B. Howell in Mono County, California, measured: total length, 91 mm.; tail, 41; hind foot, 11; ear, 14; alar expanse, 255. Its forearm measures 38 mm., tibia, 17.5.

The skull of the latter specimen (1023, coll. A. B. Howell), measures: greatest length, 15; basal length, 12.5; palatal length, 7; upper tooth row, i^1 to m^3, 6.5; width outside m^3, 5.8; interorbital width, 3.8; zygomatic width, 9; mastoid width, 7.5; lower tooth row, i_1 to m_3, 7.

Remarks.—This very beautiful new species is at once distinguished from any of the described forms of North American *Myotis* by its pale buff coloration above, contrasting with the white lower surface, and by the conspicuous and sharply defined white border of the wing membranes, and the silvery uropatagium.

The type was shot at dusk as it was flying down the slope above our camp at 11,000 feet on Mount Whitney. The locality was just above a clump of pines that formed the upper limit of timber at the lower end of a large valley encroaching upon the main peak. A rushing mountain stream dashed past at this point and a large snow bank still remained near by in mid-July.

The skull of this specimen after brief examination, was put aside for cleaning but has been unfortunately mislaid. I had hesitated to de-

scribe the species without comparison of the skull, but the capture of a second example at Mammoth, Mono County, California, by Mr. A. Brazier Howell of Covina, California, has happily made this possible. Both Dr. and Mrs. Joseph Grinnell, who have seen these two skins, were inclined to refer them to *M. lucifugus altipetens*, though recognizing that they are quite different. Mr. Howell has very generously loaned me his specimen (taken on August 2, 1917) and it agrees in every essential with the type, showing the same pale buffy coloration above, pure white below, and conspicuous white border to the wing membrane. In the dry skin, the uropatagium is a trifle darker owing to its not being as completely spread. The beautifully prepared skull has made possible a description of the conspicuous difference in the upper premolars as compared with *M. lucifugus altipetens*, a specimen of which, identified by Doctor and Mrs. Grinnell, the Museum has from Mount Tallac, California. In size and details of external structure this species very closely resembles *M. lucifugus* and *M. l. altipetens* but in its coloration and in the relations of the first two upper premolars it is widely different and is unquestionably a wholly distinct species. As lately shown by Mrs. Grinnell, the race *altipetens* is clearly only a pallid subspecies of *Myotis lucifugus*, from which it chiefly differs in its tawnier coloration. The dark shoulder spot is a distinguishing mark of the species, but no trace of such a contrasting spot is found in *M. albicinctus*.

The pallid coloration of this bat may indicate that its main range is in the desert country chiefly east of the Sierras.

Myotis longicrus interior Miller

INTERIOR LONG-LEGGED BAT

Two males were shot on different evenings (July 14 and 17) at our camp at 11,000 feet. One is much darker in coloration than the other, apparently an immature though full-sized individual. The other is a brighter tawny-olive than a specimen from Hot Springs Pass, Mono County, in the Museum collection, taken as representing typical *longicrus*. I have followed Mrs. Grinnell in referring both to the subspecies *interior*. In her Synopsis of the Bats of California, she records it from the "arid Upper Sonoran, Transition, and lower Canadian zones" from Mono County southward. The present capture extends the limits of range to a record altitude. Our first specimen was shot shortly after sundown while it was flying about among

the tops of the pines surrounding the camp. The flight is rather slow and weak as compared with that of *M. lucifugus*. In addition to its longer tibia and smaller hind foot, this species is easily distinguished from the *lucifugus* group by its well-keeled calcar.

Eptesicus fuscus (Beauvois)

LARGE BROWN BAT

At our 11,000-foot camp, one or two large brown bats were seen nearly every evening, distinguished by their size and relatively slow steady flight. Of those shot only one, an adult male, was retrieved. It is quite identical in color with two females shot at Lone Pine, at the base of the mountain, and is not to be distinguished from eastern skins. Thus the wide geographical range of the species corresponds with its altitudinal distribution.

General remarks.—It is probably significant that all five specimens obtained at 11,000 feet on Mount Whitney, representing four species of bats, are males. The presence of *Myotis longicrus interior*, *M. yumanensis sociabilis*, and *Eptesicus fuscus* above the Transition or Lower Canadian zones appears to be unrecorded in California, yet all three were collected in what would be considered for ground-living mammals, a boreal (Hudsonian) zone. This wide range in altitudinal distribution implies a certain disregard for the zonal limits which is probably due to temporary increase in distributional area of insect life, causing a temporary invasion by bats from the lesser altitudes. As recorded by Mrs. Grinnell, of sixty-one bats of the race *Myotis yumanensis sociabilis* collected at Fort Tejon, July 21 to 25, all the adults were females, thus indicating, as Mrs. Grinnell suggests, "that with the approach of summer the full-grown [adult] males leave the colony and forage singly at higher elevations." That the breeding females are more strictly confined to their proper "life zones" seems likely and is corroborated by our observations on Mount Whitney, where the few specimens taken proved to be males. It is well known that the upper levels of mountains abound in insects, many of which are wafted up by convectional diurnal air currents from below, so that during the midsummer period they would form an attraction to insectivorous bats, and thus afford cause for a local and seasonal invasion by the non-breeding individuals. It was unexpected that we should not have taken *Myotis lucifugus altipetens* on Mount Whitney, a species whose normal range includes high altitudes.

CRITERIA FOR THE RECOGNITION OF SPECIES AND GENERA

By C. Hart Merriam

In systematic work among animals and plants one is continually confronted by the theoretical question: what shall constitute the grounds for the segregation of forms into subspecies, species, subgenera, genera, and higher groups; and by the practical question of drawing dividing lines between the groups recognized. And in examining series of closely related species from different localities, one is often confronted by specimens that differ from the previously known forms, so that it becomes necessary to ascertain whether the observed peculiarities are genuine characters or merely individual variations. If they are exhibited by several specimens and it is known that these specimens came from the same area, the inference is that they represent a form worthy of recognition by name. And if the differences are comparatively slight—not of sufficient importance to be accorded full specific rank—it is customary to assume the existence of intergrades and call the form a geographic race or subspecies.

Dividing lines are now drawn much finer than formerly, and in many cases it is difficult to make up one's mind whether to treat a particular form as a species or a subspecies. When this has been decided, the result is usually published and the matter dismissed. But the next time the author has occasion to discuss the group, he is likely to find that his viewpoint has changed, or that additional specimens give the case a different aspect, so that the status of the form as previously published requires readjustment. The author himself may make the change, but if not, some other writer may be counted on to do it for him. In other words, irrespective of the *stability* or *worth* of the form, its RANK is subject to change. This may be due to information afforded by additional material, or to an altered point of view on the part of the author—for we must remember that after all we ourselves are the scales on which zoological characters are weighed, and that unhappily we have no 'Bureau of Standards' to adjust the balances of our judgment.

For guidance in deciding whether a form shall be treated as a full species or a subspecies, two diametrically opposite methods have been advocated—one *based on the presence or absence of intergrades*, the other *on the degree of differentiation* of the form in question. While

from the theoretical standpoint these methods are as far apart as possible, in practice they draw much nearer together. For in the great majority of cases of alleged intergradation the intergradation is *assumed* rather than *proved*, so that after all the student is influenced, albeit unconsciously, by the *quantity of difference*—this being in reality the determining factor in shaping his decision as to whether or not intergradation exists.

But in studying animals and plants, what difference does it make, (a) whether the worker has before him actual intergrades, or (b) whether the relationship between forms is so close that he feels justified in assuming intergradation, or (c) whether in fact at the present moment of the world's history intergradation does or does not exist? For is it not clear that in the course of evolution, intergrades, if not now present, must have existed in the past, so that their remains are likely to turn up at any moment? And is it not equally clear that if we are to destroy species and genera because of the presence of intergrades, it is only a matter of time before the discovery of living forms or the accumulation of paleontological evidence will lead to the abolition of a large proportion of our species and genera?

To my mind, the *criterion of intergradation* is one of the most pernicious that has ever been introduced into the systematic study of animals and plants and one necessarily productive of an ever-changing nomenclature. And furthermore, it has often resulted in bringing together forms between which intergradation has not only *not* been proved, but which in many cases never existed—the forms in question having arisen from a common ancestry in the distant past, rather than from one another under existing conditions. And even in the case of forms presumably derived from one another under existing conditions, what difference does it make whether the specimens at hand *prove* intergradation, or whether the closeness of their interrelationship *implies* that one is an offshoot of the other? *Is not the measure of relationship* of more consequence than the accident of survival or non-survival of intergrades?

In practice, neither the criterion of intergradation nor that of degree of divergence can claim immunity from the mistakes that come from the study of inadequate material, nor from those due to the idiosyncrasies of the personal equation, for until the arrival of the biological millennium personal opinion is likely to govern the existence or non-existence of intergrades and to stand in the way of agreement as to the measure of difference necessary to the recognition of species and genera.

In the case of errors resulting from inadequate material—the hovering demon of the systematic worker—no prophylactic treatment has yet been discovered, though experience and judgment count for much in lessening the frequency and severity of incorrect conclusions.

The history of the progress of ornithology and mammalogy in America proves that by the criterion of intergradation many forms have been described as subspecies that later proved to be either independent species or offshoots of species other than those to which they were originally referred, *showing that it is the practice of naturalists to* ASSUME *intergradation rather than prove it.* The truth of this may be demonstrated by an examination of the published records of specimens examined, for while actual intergrades are often at hand, the record shows that in the great majority of cases the author did not see specimens from intermediate localities—the only localities from which intergrades could possibly have come.

W. H. Osgood, in his monographic *Revision of the Mice of the American genus Peromyscus*, had before him the unparalleled collections of the United States Biological Survey, supplemented by those of various museums and individuals, amounting in all to upwards of 27,000 specimens. In studying this astounding wealth of material, covering practically all parts of the North American continent, he naturally found a large number of intergrades, in connection with which circumstance he says: "Until recent years continuous and perfect intergradation was demonstrable only in relatively few cases. And even now, although proved beyond doubt in group after group, in many cases it is merely taken for granted." (N. Am. Fauna No. 28, p. 17, April, 1909.)

More than twenty years ago, after serving for a number of years as a member of the A. O. U. Committee on Nomenclature and Classification of North American Birds, I was so impressed by the inconsistencies, shiftings of rank, and illogical conclusions necessitated by the intergradation rule that I published in *Science* the following protest and suggestion:

> In practice it has been found that only in a small percentage of cases does an author have at his command a sufficiently large series of specimens, from a sufficient number of well-selected localities, to enable him to say positively that related forms do or do not intergrade. The result of this obvious embarrassment is that authors usually exercise their individual judgment as to the *probable* existence or non-existence of intergradation, thus introducing the personal equation it was hoped to avoid. . . . . It would seem therefore . . . .

that it would serve a more useful purpose if the terms species and subspecies were so used as to indicate *degree of difference*, rather than the author's opinion as to the existence or non-existence of intergrades. . . . . In my judgment, forms which differ only slightly should rank as subspecies even if known not to intergrade, while forms which differ in definite, constant and easily recognized characters should rank as species even if known to intergrade.—*Science*, NS, V, pp. 753–758, May 14, 1897.

If the absence of intergrades in the hands of the student is the rule rather than the exception when dealing with *mainland forms of presumably continuous distribution*, what shall we say of closely related *insular forms* where the existence of intergrades *is an obvious physical impossibility?* And yet we all know that it is common practice—a practice in which I fully concur—to treat such forms as subspecies. Does not this demonstrate the absurdity of the intergradation rule? On the other hand, by adopting the criterion of degree of divergence, the imagination is not overtaxed, erroneous reference of subspecies to species from which they were not derived are rendered harmless, and the conclusions arrived at—usually the same as by the intergrade rule—may be stated without qualms of conscience.

To certain devotees of this rule, the discovery of intermediate forms seems to produce a psychologic shock, upsetting the judgment to such a degree that forms obviously entitled to recognition as full species are immediately degraded to the rank of subspecies.

The same is true of genera, for on the discovery of intermediate species, certain students feel impelled to bring together, under a single generic name, the members of two completely differentiated and easily recognizable genera.

And it may be added parenthetically that the same distorted point of view crops out here and there in the remote field of anthropology, some authors of distinction bringing together in a single linguistic family two or more strongly marked and perfectly distinct families because of the discovery (real or imagined) of an exceedingly remote ancestral relationship!

In these days of the universal acceptance of evolution, is it not hard to reconcile such reductions of groups with the facts that must be apparent to every one, for if species and genera and linguistic families are to be set aside because of the discovery of intermediate forms, does it not follow that sooner or later our classification is doomed to destruction, chaos taking the place of system?

THE MAMMALS OF SOUTHEASTERN WASHINGTON

By Lee Raymond Dice

[*Plates 1–2*]

The distribution and habits of the mammals of southeastern Washington are known only from scattered references in papers dealing with other subjects. As a beginning in the organization of the knowledge on the mammals of the region, the following paper attempts to state, as completely as available data permit, the distribution of the various species of mammals occurring in Walla Walla and Columbia Counties. Original notes on the habits and abundance of the various species in this area are given. In addition any original notes at hand on the distribution or habits of the mammals of other parts of southeastern Washington are included. However, no attempt is made to give a complete statement of mammal distribution in other than the two counties named.

Descriptions of the climatic and topographic conditions in southeastern Washington have been given by Russell (1897) and Calkins (1905). Weaver (1917) has described the plant habitats of Whitman County, and the author (1915) has given descriptions of the vertebrate habitats in Walla Walla and Columbia Counties.

The mammals in the vicinity of Prescott, Walla Walla County, have been studied by the author at intervals between 1905 and 1917. In that time several successive years were spent in the region and frequent visits, often of several months' duration, were made, during which observations on mammals were taken whenever possible. Most of two years were spent at Pullman, Whitman County, and a number of observations were made in that region. Camping trips have been made at various times to Wallula, Lyon's Ferry, Wawawai, and the Blue Mountains. A considerable number of specimens have been secured, so that for the smaller species the identifications are well established. The specific identifications of the larger forms are based largely on their geographic distribution.

The taxonomic determinations of a number of specimens were kindly made by Dr. J. Grinnell, of the California Museum of Vertebrate Zoology, and others by Mr. Wilfred H. Osgood, of the Field Museum of Natural History, and by Mr. Vernon Bailey, of the United States Bureau of Biological Survey. A few notes by Mr. Floyd Ken-

dall, Ranger in the Wenaha National Forest, on the larger mammals of the Blue Mountains have been included. The illustrations are from original photographs by the author.

ANNOTATED LIST OF SPECIES

Scapanus orarius schefferi. Scheffer Mole.—Occurs at Walla Walla (Jackson, 1915, 63-64).

Sorex vagrans dobsoni. Dobson Shrew.—One was trapped June 15, 1914, in willows along the Walla Walla River three miles east of Wallula. In the Touchet Valley near Prescott numbers have been trapped in brushy places and in meadows. One was seen June 3, 1914, inside a building in Prescott. In the Blue Mountains one was trapped July 26, 1914, under a log in heavy lowland fir forest near Hompeg Falls. Between March 17 and May 27, 1909, several were trapped at Pullman in *Microtus* runways on top of the prairie hills and in swampy ground near Silver Lake, and one was taken in open brushy timber beside the South Palouse River.

Neosorex navigator navigator. Navigator Shrew.—One was trapped July 23, 1914, beside the Touchet River near Hompeg Falls. Another was taken August 8 in a small swamp beside Butte Creek.

Myotis longicrus. Long-legged Bat.—Small bats were numerous in flight during the evenings of early August, 1914, in the canyon of Butte Creek. One, which was shot, proves to be of this species. Larger bats, probably of a different species, were also seen.

Myotis yumanensis subsp. Bat.—Two specimens were taken in a building in the Touchet Valley two miles east of Prescott on August 20, 1915.

Myotis californicus californicus. Little California Bat.—One specimen is reported from Blue Creek in the Blue Mountains by Miller (1897, p. 71). On May 8, 1913, one was found under the window-sill of a house in the Touchet Valley two miles east of Prescott. This specir n is seemingly somewhat large for the subspecies. Bats are quite often seen flying in the evenings in openings in the trees in the Touchet Valley near Prescott. In late June, 1914, bats of several sizes were numerous flying over Snake River in the evenings at Lyon's Ferry, but none were secured.

Lasionycteris noctivagans. Silver-haired Bat.—A specimen taken at Walla Walla is in the collection of Whitman College.

Nycteris cinerea. Hoary Bat.—Miller (1897, p. 114) reports one specimen from Walla Walla. On the morning of September 14, 1915, another was found on the ground in a cornfield in the Touchet Valley two miles east of Prescott.

Ursus americanus altifrontalis. Black or Cinnamon Bear.—Reported to occur rather commonly throughout the Blue Mountains. Tracks were seen in early August, 1914, in Douglas spruce forest on the ridge near Twin Buttes Ranger Station, and in one place a freshly turned over log in western larch forest gave evidence of a bear's presence.

Canis latrans lestes. Mountain Coyote.—June 9, 1914, fresh signs were seen in the bunchgrass hills southeast of Wallula. June 13, one took a jack rabbit from a trap set in sagebrush east of Wallula. He ate the fore parts and buried the

remainder, returning the next day to the cache. A number of coyotes are trapped in the winter in the region and they are reported very abundant. In the bunchgrass hills of Walla Walla and Columbia Counties they are common, and may sometimes be seen in the open parts of the Touchet Valley, though they do not often go into the timber. They are reported to occur in the Blue Mountains.

Vulpes sp. Red Fox.—Reported to occur rather commonly on the ridges of the Blue Mountains. In July and August, 1914, a number of tracks were seen along the trails on the ridges in burnt-over areas and in low brush.

Procyon psora pacifica. Pacific Raccoon.—Reported to occur along the Walla Walla River near Wallula. A few occur along the Touchet River in the neighborhood of Prescott. They are occasionally noted in the timber along the stream and their tracks are sometimes seen along the river bars. In late June, 1914, raccoons were reported to be causing considerable damage to poultry at Lyon's Ferry, and a number of fresh tracks were seen in the soft mud along the margin of Snake River.

Martes sp. Marten.—Mr. Floyd Kendall reports that martens occur in the canyons of the Blue Mountains.

Mustela cicognanii lepta. Weasel.—A young specimen was taken August 7, 1914, in heavy brush along Butte Creek.

Mustela arizonensis. Mountain Weasel.—The skull of a female from Prescott is smaller and relatively shorter and broader than skulls from the Sierras of California, but otherwise the specimen is typical. Mountain weasels occur quite frequently in the neighborhood of Prescott. They range over the bunchgrass hills, but are much more abundant near brush and timber in the Touchet Valley. They have been taken in traps set at the openings to the tunnels of the Columbian ground squirrels and in the burrows of pocket gophers. Occasionally they cause damage in poultry yards. A female taken June 5, 1913, at Prescott contained no embryos.

Mustela vison energumenos. Pacific Mink.—A few occur along the Touchet River near Prescott. They wander out into the timbered parts of the valley and occasionally visit poultry yards. Mr. Floyd Kendall reports that they occur along the streams in the Blue Mountains.

Mephitis occidentalis major. Great Basin Skunk.—Howell (1901, p. 36) notes a specimen from Touchet. They are reported to be quite numerous in the timber along the Walla Walla River east of Wallula. A few live in the brush and timber along the Touchet River near Prescott; and they have been trapped in the prairie hills over a mile from the river. At Lyon's Ferry a number occur along the shores of Snake River.

Taxidea taxus neglecta. California Badger.—Badger mounds were numerous in June, 1914, in the sagebrush near Wallula, but they were still more abundant in the bunchgrass hills to the southward. On Eureka Flat they were numerous in both sagebrush and in bunchgrass. Numbers occur throughout the bunchgrass region of Walla Walla and Columbia Counties. In the Blue Mountains a few occur on the ridges in open places and among the low bushes. On June 10, 1914, about 7 a.m., a group of four badgers were seen hunting in sagebrush three miles east of Wallula. They all seemed to be about the same size, and this was probably a family party returning from a hunt. They kept close together and moved at a slow trot, exploring the ground carefully, with nervous movements.

Finally they all went into a group of badger holes near a small ravine, two individuals going into the same hole. Several remained for some time at the mouths of the burrows to watch me, as they seemed to be very curious, but soon all retired and were not again seen. They seemed to be able to travel backward equally well as forward, and when only several feet from a burrow they nearly always backed toward and down into it. Every one seemed to go into the burrow backward.

Felis oregonensis hippolestes. Rocky Mountain Puma.—Mr. Floyd Kendall reports that pumas are rare in the Blue Mountains.

Lynx ruffus subsp. Lynx.—A few are reported to occur along the Walla Walla River east of Wallula. Tracks in snow were seen December 25, 1908, in the timber along the Touchet River two miles east of Prescott. In late July, 1914, a number of tracks were seen in alpine fir forest on the ridge at the head of the North Fork of the Touchet River, and a few in burnt-over and brushy places on the ridges near Twin Buttes Ranger Station.

Onychomys leucogaster fuscogriseus. Gray Grasshopper Mouse.—Hollister (1914, p. 444) records two specimens from Touchet. On June 12, 1914, one was trapped in sagebrush near the top of a small wind-eroded bluff at the edge of the valley of the Walla Walla River three miles east of Wallula. Extensive trapping in the same locality failed to secure any other specimens.

Reithrodontomys megalotis nigrescens. Dusky Harvest Mouse.—In early June, 1914, numbers were trapped in the willows along the Walla Walla River three miles east of Wallula. One was taken on June 16 at the head of a ravine in the bunchgrass hills south of the same locality. Along the Touchet River east of Prescott they are abundant in brushy places and in meadows. One was found in a stubble field a half-mile from the river on December 24, 1908. Half-grown young were taken at Prescott in 1913 as early as April 10, and individuals still immature were taken in the latter part of July, 1914. Captives kept in large boxes did not eat raw potatoes, but were fond of dry oatmeal and wheat. Several half-grown young partly ate one of their number which died. In the summer of 1915 signs of mice were noted in a deserted bird's nest about five feet above ground in an arbor vitae shrub growing in a garden near Prescott. A trap was set and an adult male harvest mouse secured on July 9. The bird's nest apparently was used as a resting place by the mouse.

Peromyscus maniculatus gambelii. Gambel White-footed Mouse.—In the early part of June, 1914, eleven white-footed mice were trapped in the willows along the Walla Walla River three miles east of Wallula. Several were taken on June 14 in sagebrush not over 200 yards from an irrigating ditch near the same place, but the species does not form a part of the typical sagebrush association. One was taken June 16 from a line of 10 traps set among the rocks on a hillside in the range of hills to the south. In the neighborhood of Prescott the species is common in the timber along the Touchet River. They are sometimes found in houses and barns. A few live in the bunchgrass covered hills and they have been taken over a mile and a half from the nearest water. At Lyon's Ferry two were taken on June 25, 1914, in traps set about driftwood and rocks along the shores of Snake River, and a number were taken at the bases of the basaltic cliffs and on rocky slopes. In the Blue Mountains in the summer of 1914 white-footed mice were taken in every land habitat where trapping was done. At

Hompeg Falls they were taken in lowland fir forest, in western larch forest, in yellow pine forest, and on rocky slopes. They were less common in heavy forest than in the more open brushy places and were very abundant on the rocky slopes, especially near low shrubs. On the high ridges between the Touchet and Wenaha Rivers white-footed mice were taken in alpine fir forest, in western larch forest, in Douglas spruce forest, and in buckbrush. In the canyon of Butte Creek several were trapped in the brush and timber along the stream.

A female white-footed mouse heavy with young was taken March 27, 1908, in the bunchgrass hills near Prescott. A fully grown subadult male was taken May 24, 1914, in a farm building in the Touchet Valley east of Prescott. One old female taken on July 2, 1914, in the brush along the Touchet River near the same place contained four large embryos; another contained a mass of unformed embryos; while a third contained no embryos. Of two young females taken at the same time and place one contained four and the other five medium-sized embryos. On July 8, 1915, a nest containing the mother and five half-grown young was found in a building at this locality. The nest was constructed of small bits of cardboard, paper, sacks, cloth, and a few chicken feathers. The bottom of the nest contained much excreta. On September 13, 1909, a female taken in a stubble field in the Touchet Valley near Prescott contained two large embryos. Evidently these mice breed at least twice in each season in this region, and the females may breed in the same season in which they are born. Of fourteen females examined in the Blue Mountains between July 22 and 26, 1914, none contained embryos.

A captive subadult male studied at Prescott during the latter part of May, 1914, elaborated a nest from cotton placed in the box. He readily ate rolled oats and nibbled at a raw potato. In eating small objects the body was supported on the hind legs and the fore feet used to handle the food and present it to the mouth.

Peromyscus maniculatus artemisiæ. Sagebrush White-footed Mouse.—Common at Pullman on the prairie hills, about rocks, in cultivated fields and orchards, in meadows, and in the brush and timber along streams.

Neotoma cinerea occidentalis. Western Bushy-tailed Wood Rat.—Reported to be common about houses along the Walla Walla River east of Wallula; a young one taken in a cellar was seen on June 10, 1914. A nest was found June 15 under a large rock in a ravine at the base of the hills southeast of Wallula. One was trapped in 1893 in a cellar in the prairie hills two miles southwest of Prescott; another was taken in 1910 in the cellar of a house beside the Touchet River two miles east of Prescott; these animals lived in burrows dug in the soft dirt walls of the cellars. In the Blue Mountains wood rats are reported to be numerous about cabins.

Evotomys gapperi saturatus. Dusky Red-backed Mouse.—Two were trapped in the summer of 1914 in lowland fir forest in the canyon near Hompeg Falls; on the ridges between the Touchet and Wenaha Rivers one was taken in thick buckbrush, one in western larch forest, and two in alpine fir forest in a small cove near the top of the ridge; along Butte Creek one was taken in a swampy place and one in the brush and timber along the stream.

Microtus nanus canescens. Gray Meadow Mouse.—Numerous in the meadows and in brushy places along the Touchet River near Prescott. They do not seem

to wander far from water. Bailey (1900, p. 31) reports one specimen from Fort Walla Walla. At Pullman their runways are common in the grassland of the tops and slopes of the hills. April 1, 1913, a female with eight very small embryos was taken in brush beside the Touchet River near Prescott. April 6 another female caught in an alfalfa meadow contained six well-developed embryos each about 22 mm. in length. Half-grown young were common as early as April 1 in that year.

April 6, 1913, a set of workings of this species in an alfalfa meadow near Prescott was dug out. Fresh surface runways extended in several directions 1 to 3 meters from a group of three holes which were not over 50 cm. from each other. The three holes were the openings to three tunnels which connected together near the underground opening to a fresh nest. The nest was composed of dried grasses and its top was several centimeters below the surface of the ground. The passages were fairly intricate, but not long, and in a blind alley a female heavy with young was found. The previous day a large male had been trapped near the entrance to one of the tunnels. As this system of workings was at least 50 meters from any other group of workings the evidence is strong that it was constructed and occupied by a single pair of mice. In a set of tunnels beside an old fence, partly dug out on April 13, one tunnel ran underground for more than four meters and had several branches. A fresh underground nest filthy with excreta connected with the tunnel. A young individual was captured in the tunnel.

Captives are very fond of raw potatoes and also eat oatmeal and to a slight extent grains of wheat.

Microtus mordax mordax. Biting Meadow Mouse.—Very abundant in the first week of August, 1914, in brush and timber and especially in swampy places along Butte Creek. On July 28 one was trapped in alpine fir forest on the top of a ridge at the head of the North Fork of the Touchet River. On August 9 two half-grown young were trapped in brush beside a spring on the ridge at Twin Buttes Ranger Station. A female taken on Butte Creek August 5 contained two large embryos nearly ready for birth. Half-grown young were numerous at the same place on that date. Three were trapped in late May, 1909, in brush along the South Palouse River at Pullman.

Ondatra zibethica osoyoosensis. Rocky Mountain Muskrat.—Hollister (1911, p. 36) records specimens from Touchet and from Walla Walla. On June 15, 1914, one was seen swimming in the Walla Walla River three miles east of Wallula. A considerable number occur along the Touchet River near Prescott. At Pullman a few occur along the South Palouse River and in Silver Lake.

Rattus norvegicus. Norway Rat.—House rats have entered southeastern Washington and are rapidly increasing in numbers. They are common in Walla Walla and a few occur in Prescott, and they are spreading along the valleys.

Mus musculus musculus. House Mouse.—On June 13 and 14, 1914, ten were trapped in the willows along the Walla Walla River three miles east of Wallula. In the neighborhood of Prescott they are abundant about the houses in town and in the valley, and even about farm buildings far out in the bunchgrass hills. In the Touchet Valley they are often found about grain stacks and in the timber and brush along the river. One was taken May 29, 1909, in brush by the South Palouse River at Pullman.

Thomomys columbianus. Columbian Pocket Gopher.—Two specimens were taken in June, 1914, in the meadows at the edges of the willows along the Walla Walla River east of Wallula, and mounds were numerous at this place. A few mounds were also observed in sagebrush on the lower slopes of the hills to the south. Pocket gophers occur sparingly in the prairie hills near Prescott, but they are much more abundant in the meadows and orchards along the Touchet River. They occur in open timber, but only very rarely under heavy shade. In an alfalfa meadow of about ten acres 75 gophers were trapped in the spring of 1913.

Gophers are active more or less all winter near Prescott, but there is a great increase of activity in the spring, as is shown by the number of fresh mounds thrown up at that time. In 1913 the increase of activity was very apparent in the early part of March. Seemingly, the males become active in spring several weeks before the females; during March and the early part of April, 1913, nearly all those taken were males. Gophers seem to breed early in the vicinity of Prescott. In 1913 small animals from one-half to three-fourths grown were common in the latter part of March and in April. One female taken April 5, 1913, contained a mass of unformed embryos. April 29 a female was taken in the same burrow from which a male had been taken a few days previously. On April 29 in another burrow a fresh nest was found. This nest was made of grass and alfalfa leaves, some of which were still green. The nest, which had only one entrance, was about 8 inches below the surface of the ground and was about 2 feet from the nearest mound.

Thomomys fuscus fuscus. Brown Pocket Gopher.—Numerous all over the Blue Mountains. Near Hompeg Falls they were abundant from the bottoms of the canyons to the tops of the ridges, occurring even in very rocky ground. They were abundant on rocky slopes and in yellow pine forest. A few occurred also in lowland fir forest in the bottom of the canyon under quite heavy shade. In dry places on the higher ridges of the mountains they were common in open ground, in brush, in alpine fir forest, and in western larch forest. At Pullman they are common in the valleys and on the prairie hills.

Perognathus parvus parvus. Oregon Pocket Mouse.—The skulls of pocket mice taken at Wallula have smaller bullæ than those of *Perognathus l. lordi* from Okanagan, British Columbia, or from Prescott, Washington, and cannot then be referred to *P. l. columbianus*, which is stated by Osgood (1900, p. 40) to have larger bullæ and mastoids than *lordi*. These specimens agree with the description of *parvus* and are referred to that form. The pelage is lighter in color than that of *lordi*.

A considerable number of pocket mice were taken in sagebrush near the Walla Walla River three miles east of Wallula during June, 1914. They occurred both in areas of drifting sand and in areas of packed sand. One was trapped in bunchgrass on top of the hills to the south. All seem to be of the same species. These mice are sometimes active during the day as is shown by tracks on wind-blown sand. The cheek pouches often contain seeds of grasses and of other plants. A female taken June 10 contained four rather large embryos.

Perognathus lordi lordi. Northwest Pocket Mouse.—Common in the bunchgrass areas and grain fields of the region about Prescott. Although they occur in the open parts of the Touchet Valley none have been taken near timber or brush. A female taken near Prescott July 7, 1914, contained eight small

embryos, each about 3 mm. in length. As half-grown young were common at this time it is probable that more than one litter is produced a year. As shown by tracks in the dust the tail is sometimes held completely clear of the ground when traveling; it may touch the ground at each jump; or it may be allowed to drag constantly.

A pocket mouse which was captured alive near Prescott August 3, 1910, was kept as a captive. He was fed on unthreshed heads of wheat, which he shelled out, placing the grains in his cheek pockets. The work of filling the pockets seemed to be mainly performed by the fore feet. When both pockets were full he would dig a hole in the ground on the floor of his cage and bury the wheat. He was offered bits of apple and potato, but did not eat them. After being kept for two weeks in a dry cage and fed only on wheat he was offered water, but refused it. Another pocket mouse captured in the same locality on August 25 was placed in a jar without material for a nest. The next morning the temperature had fallen to below 40° F. and the mouse was found cold and stiff. He was handled, but gave no signs of life. At 11 a.m. the temperature had risen and the mouse resumed activity. However, when the experiment was repeated the following night the mouse did not recover.

Perognathus lordi columbianus. Columbian Pocket Mouse.—Osgood (1900, p. 40) records specimens of this pocket mouse from Touchet.

Perodipus ordii columbianus. Columbian Kangaroo Rat.—Found commonly during June, 1914, in the sagebrush east of Wallula. They seemed equally abundant on drifting sand and on packed sand areas. These animals are somewhat active throughout the daytime as was shown by fresh tracks in sand where the wind was continually covering the old marks. In traveling the tail often touches the ground at each hop, but it may be carried entirely clear, or more rarely may be allowed to drag.

Zapus princeps oregonus. Blue Mountain Jumping Mouse.—A number were trapped in early August, 1914, on top of the ridge near Twin Buttes Ranger Station. Nearly all were taken in thick brush, but one was taken in western larch forest not far from a patch of buckbrush where they were abundant.

Erethizon epixanthum epixanthum. Yellow-haired Porcupine.—A porcupine is reported to have been killed a few years ago along the Walla Walla River a short distance east of Wallula. A few have also been reported from the neighborhood of Prescott. Mr. Floyd Kendall reports that they occur in the Blue Mountains.

Marmota flaviventris avara. Pallid Yellow-bellied Marmot.—Common among the rocky cliffs on both sides of Snake River at Wawawai.

Citellus columbianus columbianus. Columbian Ground Squirrel.—Common on the prairie and in the cultivated fields at Pullman. The large ground squirrels of the Touchet Valley and the Blue Mountains are also referred to this form, although they are larger in size and have a deeper red coloration on the flanks and tail than do specimens of the typical form from Pullman, Washington, and Moscow, Idaho. These squirrels are common along the Touchet Valley as far down as Lamar. At Prescott they occur in timber but are most abundant just at the edge of timber or brush. They occur along fences and sometimes climb the fence-posts. They are found in the open parts of the valleys and sometimes occur a half-mile or more out in the bunchgrass hills. In the Blue Mountains

numbers occur in buckbrush on the ridges. At Hompeg Falls a number were found in July, 1914, in lowland fir forest, especially in openings in the forest, and on rock slides near the bottom of the canyon.

Most of these squirrels go into æstivation early in the summer, but they remain active much later than do the Townsend squirrels. At Prescott several were seen as late as July 11 in 1914. In the Blue Mountains they were seen as late as July 28.

Citellus townsendii. Townsend Ground Squirrel.—Abundant in early June, 1914, in the sagebrush east of Wallula. A number also occurred in the bunchgrass of the hills to the south. These animals were very fat in preparation for their approaching æstivation. On Eureka Flat they were numerous in bunchgrass and in sagebrush areas. Throughout northern Walla Walla County they are numerous over the bunchgrass hills. In the Touchet Valley east of Prescott a few live in gardens and in open places in the timber along the river, but in general they avoid brushy or timbered areas. A few were noted April 2, 1909, at Wawawai in the grassland at the bottom of the Snake River Canyon, on the north side of the river.

A female taken at Prescott March 28, 1913, contained a number of unformed embryos. Partly grown young were trapped at that place on April 17 and 19 of 1913. Half-grown young were common near Wallula during the first week of June, 1914. These squirrels come out of hibernation very early in spring and tracks may often be seen on the snow. They go into æstivation early in summer, and in 1914 none were seen at Prescott after June 25.

Eutamias amœnus amœnus. Klamath Chipmunk.—Rare in the timber along the Touchet River in the prairie area as far down as Prescott. One was taken April 20, 1913, in brush two miles east of Prescott. In the Blue Mountains they are numerous in every sort of brushy habitat, but seem to be most numerous in the brush near the tops of the ridges. At Hompeg Falls numbers were seen in lowland fir, western larch, and Douglas spruce forests at the bottom of the canyon and in yellow pine forest on the lower slopes. On Butte Creek a few occurred in the brush and deciduous timber along the stream. On the higher ridges they were abundant in alpine fir, western larch, and Douglas spruce forests.

One watched July 24, 1914, near Hompeg Falls, seated himself on a small twig in the top of a service-berry bush while he ate some of the partially dried fruit. The fore feet were used to assist in handling the food. Another watched August 2 on top of the ridge near Twin Buttes Ranger Station was feeding on grass seeds. He would cut off a grass stem as high up as he could reach and then pass the head sideways through his mouth, removing the seeds and discarding the chaff as the head of grass passed through. In this case also the fore feet were used to handle the material.

Callospermophilus chrysodeirus chrysodeirus. Golden-mantled Ground Squirrel.—A number were seen about the rocky slopes and in yellow pines on the sides of the canyon at Hompeg Falls in July and August, 1914. A few were seen in buckbrush, in open alpine fir forest, in western larch forest, and in open Douglas spruce forest on the higher ridges of the mountains. They seem to prefer partially open areas and the neighborhood of rocks.

Sciurus hudsonicus richardsonii. Richardson Squirrel.—Common during July and August, 1914, in the lowland fir forest at Hompeg Falls. A few were observed in heavy Douglas spruce forest near the tops of the mountain ridges and one was seen in young lodgepole pine forest near the top of a ridge. In the canyon of Butte Creek one was seen in the top of a high cottonwood tree. They are also reported by Allen (1898, p. 266) from Blue Creek in the Blue Mountains of Walla Walla County.

Castor canadensis canadensis. Beaver.—A few live along the Touchet River east of Prescott, where their homes are in the banks of the stream. Sometimes they cause damage by gnawing fruit trees in the orchards near the river or by cutting down small trees. However, most of their labor is spent in cutting down willows or cottonwoods of little importance to the farmer. They are even of some value to the agriculturist in helping to stop with sticks and mud the leaks in the brush dams commonly placed in the river to divert water for irrigating ditches. One group of beavers in the summer of 1913 built each night a small dam across the entrance to an irrigating ditch, but when a rope was stretched across the ditch at that point they did not cause further mischief.

In the Blue Mountains beavers are reported to be common along many of the streams. In the summer of 1914 small beaver dams were found to be numerous on Butte Creek. The dams were placed across small sloughs and across the tiny streams draining from springs. Cuttings seemed to be made on all kinds of trees. Tooth marks were noted on willows, cottonwoods, thorns, and on one small Douglas spruce.

Lepus townsendii townsendii. Western White-tailed Jack Rabbit.—Reported from Touchet by Nelson (1909, p. 82). They are also reported by farmers to occur rarely on the bunchgrass hills southeast of Wallula. Near Prescott and Lyon's Ferry a number occur in the bunchgrass hills. This species does not make definite runways such as are made by the black-tailed jack rabbits. In the region near Prescott they become paler in winter than in summer, but no white individuals have been noted.

Lepus bairdii bairdii. Rocky Mountain Snowshoe Rabbit.—A few were seen in July and August, 1914, in lowland fir forest near Hompeg Falls. One well grown young was shot in lowland fir forest along Butte Creek and signs were numerous in the brush along that stream. On top of the ridges near Twin Buttes Ranger Station signs were seen in damp Douglas spruce forest and were very numerous in patches of buckbrush.

Lepus californicus wallawalla. Washington Jack Rabbit.—Abundant during June, 1914, in the sagebrush of western Walla Walla County. A few were seen in the bunchgrass hills southeast of Wallula and they were fairly common in the bunchgrass hills north of Nine-mile. On Eureka Flat and the Lower Flat a few were seen and runways were numerous in sagebrush and in bunchgrass. They are rarely found in the bunchgrass areas near Prescott. The type locality of the subspecies is Touchet (Merriam, 1904, p. 137).

These jack rabbits make well-defined trails. Their forms are often placed under a sagebrush just on one side of the trail, or a form may be placed right in the trail. Usually these forms are only a slight depression in the ground, but sometimes under a thick sagebrush a more elaborate form requiring quite a little digging is constructed. Washington jack rabbits seem to be most active in the

morning and evening, although they are active more or less throughout the day and night. While I was camped near Wallula in June, 1914, they were in the habit of coming to an irrigating ditch to drink, and in the evening fifteen or twenty might be in sight at a time. They were especially numerous after a very hot day. During the hottest days they were not very active and seemed to dislike to leave their forms.

When the tail of the black-tailed jack rabbit is curled up, the black marking on the upper side of the tail and that on the lower part of the rump is concealed, and the animal appears entirely dull gray from the rear. When the tail hangs down the black marking is very conspicuous and might well serve as a directive mark. When the animal is moving normally the tail hangs down, and it is not curled up when the rabbit is shot at or when running away from a dog. Seemingly the marking is concealed only when the animal is at rest in its form. At other times it acts as a directive mark, and the animal is able to escape its enemies by means of its great speed.

These jack rabbits are extensively hunted near Wallula by sportsmen who come from Walla Walla and other towns, but they still maintain their abundance. Old males become very shy, but the young individuals and females are less wary. The young, many of which were nearly full grown in June, are excellent eating. The night trains on the railroads near Wallula are reported to run over and kill a great many, which, blinded by the light, refuse to leave the track.

Sylvilagus nuttallii nuttallii. Washington Cottontail.—Common in the willows along the Walla Walla River east of Wallula and numerous in the sagebrush, especially within a short distance of streams. On June 16, 1914, one was seen among rocks on a hillside southeast of Wallula, and several half-grown young were seen in the bunchgrass of the hills above. A number occur in the timber along the Touchet River near Prescott. In late June, 1914, a few were seen about the rocks and cliffs of the canyon of the Snake River at Lyon's Ferry, and they are reported to be quite common among these rocks.

Cervus canadensis canadensis. Wapiti.—Mr. Floyd Kendall reports that wapiti formerly occurred in the Blue Mountains, but that none now occur there, except a few which have been reared in captivity and liberated.

Odocoileus hemionus hemionus. Rocky Mountain Mule Deer.—There are perhaps several species of deer in the Blue Mountains of Washington, but the mule deer is the only one certainly known to be present. During the summer of 1914 a few tracks of deer were seen in lowland fir forest near the head of the North Fork of the Touchet River. A number of tracks were found and one deer was seen in Douglas spruce forest on the ridges near Twin Buttes Ranger Station. They are reported to be most abundant in the brush at the heads of coves and on the higher slopes of the mountains. Mr. Chas. Clague captured a fawn, seemingly lost, in the bunchgrass hills two miles southwest of Prescott in the spring of 1890, following a heavy snow. No deer normally occur in that region.

Alces americanus shirasi. Shiras Moose.—Mr. Floyd Kendall reports that moose formerly occurred in the Blue Mountains, but that none are now found there.

Ovis canadensis canadensis. Bighorn.—Bighorns are said by Mr. Floyd Kendall to have formerly occurred in southeastern Washington in the Blue Mountains, but to be now extinct in the region.

Oreamnos americanus missoulæ. Missoula Goat.—Goats are reported by Mr. Floyd Kendall to have occurred at one time in the Blue Mountains of Washington, but they are now absent from the region.

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EXPLANATION OF PLATES

PLATE 1

FIG. 1. COTTONWOOD-WILLOW HABITAT ALONG THE TOUCHET RIVER TWO MILES EAST OF PRESCOTT

Under the high cottonwood trees there is a very thick growth of underbrush. September 14, 1915.

FIG. 2. YELLOW PINE COVERED HILLSIDES ON THE SOUTH FORK OF THE TOUCHET RIVER ABOUT TEN MILES ABOVE DAYTON

In the valley Douglas spruces are dominant. A cultivated field is in the foreground. August 1, 1915.

PLATE 2

FIG. 1. RABBIT BRUSH HABITAT IN THE SAGEBRUSH AREA FOUR MILES EAST OF WALLULA

The plants are chiefly rabbit brush, *Chrysothamnus*. June 13, 1914.

FIG. 2. THE CANYON OF SNAKE RIVER, LOOKING WEST FROM LYON'S FERRY

Along the river are numerous high cliffs of basalt, while the hills above are covered by bunchgrass. The river is about 1000 feet below the tops of the hills. June 24, 1914.

FIG. 1

FIG. 2

(Dice: Mammals of Southeastern Washington.)

UNIV OF ILLINOIS

FIG. 1

FIG. 2

(Dice: Mammals of Southeastern Washington.)

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PRELIMINARY NOTES ON AFRICAN CARNIVORA

By J. A. Allen

The purpose of these notes is to secure early record for certain results obtained in a study of some 600 specimens of African Carnivora collected by the American Museum of Natural History Expedition in Belgian Congo during the years 1909–1915, under the leadership of Herbert Lang and James P. Chapin of the scientific staff of the Museum, as the final report, now practically finished, will be delayed in publication. These notes relate in part to some of the more interesting of the new forms thus disclosed and in part to questions of taxonomy and nomenclature. The full report will include numerous illustrations, from pen drawings, of the cranial and external characters of not only the new forms but also of the principal generic types of the Viverrinæ and Herpestinæ represented, and numerous reproductions of field photographs of specimens in life or in the flesh, and photographs from skins illustrating individual color variation, for which large series of specimens from single localities afford abundant material.

These preliminary notes are here published with the approval of the American Museum authorities. The full report will form part of Volume XLII of the Museum *Bulletin* which will be exclusively devoted to the Congo collection of mammals. The first part of this volume, containing the report on the Insectivora, is already in press.

Genus **Aonyx** Lesson

Lutra (part) most authors prior to 1900.

Aonyx Lesson, Man. de Mammalogie, 1827, p. 157. Type, by monotypy, *Aonyx delalandi* Lesson (1827) = *Lutra inunguis* F. Cuvier (1823) = *Lutra capensis* Schinz (1821).

Anahyster Murray, Proc. Roy. Phys. Soc. Edinburgh, II, 1860, p. 157. Type, by monotypy, *Anahyster calabarica* Murray, sp. nov., from Old Calabar, West Africa. Gray, Proc. Zool. Soc. London, 1865, p. 129. (As a subgenus of *Aonyx;* restricted to the clawless otters of Africa.)

Aonyx (part) Gray, Proc. Zool. Soc. London, 1865, p. 129. (Restricted to the Indian clawless otters.) Thomas, Ann. Mag. Nat. Hist. (8), I, 1908, p. 387. (Part; includes both the African and Indian species.)

The genus *Aonyx* Lesson was exclusively based on the so-called clawless otter of the Cape region of South Africa (*Lutra capensis* Schinz, renamed *Aonyx delalandi* by Lesson), of which the genus *Anahyster* Murray, based on a clawless otter from Old Calabar, is a synonym.

Notwithstanding the great specialization of its type, *Aonyx* did not receive general recognition as a genus till the present century. J. E. Gray, in 1865 and later, recognized *Aonyx* as a full genus, but he combined with the *Aonyx capensis* group the clawless otters of southern Asia. More than this, he divided *Aonyx*, as he recognized it, into two groups, and wrongly assigned his restricted *Aonyx* to the Asiatic species and adopted *Anahyster* for the African species, the only species originally included in *Aonyx*.

Lesson, the founder of *Aonyx*, proposed *Leptonyx* in 1842,[1] for the clawless otters of Asia, a name unfortunately doubly preoccupied, first for a genus of birds (Swainson 1821) and later for a genus of seals (Gray 1837). Both groups are entitled to full generic acceptance, according to standard modern opinion as to what constitute generic differences among mammals. *Aonyx*, however, has hitherto stood for both groups, whenever used in either a generic or a subgeneric sense.

While the foot structure of the clawless otters of Africa and the small-clawed otters of Asia is similar, the external and cranial characters, including the dentition, are widely different in the two groups. Yet the clawless Asiatic otters have been, and are still, referred to *Aonyx*, when not placed in *Lutra*, and, with one exception, all the figures that I have seen purporting to give the cranial and dental characters of *Aonyx* have been based on the skulls of Asiatic forms. Hence a non-typical and, from my viewpoint, a non-congeneric form not originally included in the genus has been taken to typify *Aonyx*, so far as the literature of the group is concerned.[2]

Micraonyx nom. nov.

Leptonyx (subgenus of *Lutra*) Lesson, Nouv. Tableau Règne Animal, Mamm., 1842, p. 72. Type, by tautonymy, *Lutra leptonyx* Horsfield = *Lutra cinerea* Illiger.

The name *Leptonyx* is preoccupied by *Leptonyx* Swainson (1821) for a genus of birds, and by *Leptonyx* Gray (1837) for a genus of seals. It is here replaced by *Micraonyx*.

While the external differences are by no means insignificant, those of the skull and teeth are such as most taxonomers consider as of high

[1] Nouv. Tableau Règne Anim., Mamm., 1842, p. 72.

[2] See, for example, the well-known figure in Flower and Lydekker's 'Mammals Living and Extinct,' 1891, p. 568, fig. 261, "of the palate of *Lutra cinerea*," reproduced from 'Palæontologia India.'

importance. Some of these differences have not escaped record, but this fact has not directed to them the attention they deserve. While at first glance the skulls of *Aonyx* and *Micraonyx* appear to have many features in common, they differ greatly in proportions and in the relative size of corresponding teeth. In *Aonyx* the antorbital portion of the skull is heavily developed, being broad, with large incisors and canines, while the carnassials and molars are only moderately developed in proportion to the size of the skull; all these conditions are reversed in *Micraonyx*. In the latter the facial portion of the skull is narrow and weak, with small incisors and canines, while the carnassials and molars are enormously developed for the size of the skull, these teeth about equalling those of *Aonyx*, which has a skull fully three times the bulk of the skull of *Micraonyx*. This creates a vast difference in the relative breadth of the palatal space between the carnassials and molars of the maxillary series, which in *Micraonyx* is much less than the transverse breadth of m^1, while in *Aonyx* this space is one and a half times greater than the transverse breadth of m^1.

Osbornictis[3] gen. nov.

Type, *Osbornictus piscivora* sp. nov.

Skull long and lightly built; teeth small, especially the carnassials and upper molars, with correlated size reduction in all the other teeth. Sagittal and lambdoid crests and postorbital processes highly developed. Rhinarium small, without a median sulcus. Soles and palms bare, not furred as in *Genetta* and allied genera. Color of body uniform red; tail black; head-markings white; wholly without the black spots and bands so characteristic of the other Viverrinæ. Habits piscivorous.

Osbornictis is most nearly related to *Genetta*, from which however it strikingly differs. It requires comparison with no other genus. The type agrees closely in size with *Genetta victoriæ*, the largest of the genets.

Osbornictis piscivora sp. nov.

Type, No. 51514, ♂ ad., Niapu, Belgian Congo, December 1, 1913; Herbert Lang and James P. Chapin, American Museum Congo Expedition. Orig. No. 2147. Skin and complete skeleton.

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[3] Named for Professor Henry Fairfield Osborn, President of the American Museum of Natural History, whose deep interest in the American Museum Congo Expedition contributed greatly to its success in the field and later toward the early publication of its scientific results.

External measurements about as in *Genetta vistoriæ* Thomas, but soles and palms naked, and coloration radically different; skull slender, dentition weak, the teeth about half the transverse diameter of the corresponding teeth in *G. victoriæ*.

Entire upperparts uniform dark chestnut red, without trace of spots or bands; this color, in reduced intensity, extends over the underparts from the pectoral region to the base of the tail, lightening to dull red mesially with a slight mixture of whitish hairs along the midline of abdomen; head from muzzle posteriorly and laterally to the eyes, pale fuscous brown with a tinge of reddish, broken by a pair of elongated spots of clear white between the eyes divided by a narrow fuscous band, and a narrower, more indistinct posterior pair between the anterior base of ears; a narrow black eyering; front and sides of muzzle and sides of head below eyes whitish, intensified to a clear white spot just below the anterior two thirds of each eye; ears exteriorly blackish, which color extends mesad over the lateral third on each side of the crown; ears nearly naked internally and edged with long whitish hairs; chin and throat white, passing into brownish posteriorly with scattered whitish hairs on the foreneck; tail entirely without annulations, heavily clothed with long black hairs, 45–50 mm. in length, the heavy underfur pale brownish gray, about 25–30 mm. in length; fore and hind limbs dull slightly rufescent brown, passing into blackish brown on upper surface of feet. Rhinarium similar in contour to that of *Genetta victoriæ*, but about one half smaller. Soles and palms naked, the pads not enclosed nor separated by dense fur, as in *Genetta* and *Civettictis*, with the carpal pad greatly elongated as in *Viverricula*. Pelage long and dense, that of the tail especially so, its tail equal in size to that of the most heavy-tailed examples of *G. victoriæ*.

Represented by the adult male type (skin and complete skeleton) and an imperfect native-made skin (without skull, feet, or tail), similar to the type in coloration, length of body, and in head-markings, except that the latter are yellowish through staining instead of white. (Measurements and illustrations of the cranial and external characters and a colored plate of the animal will appear in the final report on the Congo Carnivora.)

Xenogale gen. nov.

Type, *Xenogale microdon* sp. nov.

Toes 5–5; soles and palms furred; dental formula, relative size and general structure of the teeth as in *Herpestes* (s.s.); skull relatively short and broad, postpalatal region especially so; postorbital constriction deep and close behind the postorbital processes; braincase short, proportioned about as in *Ichneumia*, very different in form from the braincase of *Herpestes;* tail short and thick, as in *Ichneumia* and *Atilax*, in contrast with the long slender tail of *Herpestes*, in which the heavily haired portion is restricted to the basal third.

Xenogale presents a singular combination of characters. Externally it strongly resembles *Atilax*, particularly in the texture and coloration of the pelage, and in the field was mistaken for an *Atilax*, but in cranial characters and in dentition the two forms present little

similarity. It resembles *Ichneumia* in external form, in its long heavy overhair, and in having furred palms and soles, thus differing in this latter respect from both *Herpestes* and *Atilax*. It has the light and rather weak dentition of *Herpestes*, but the skull is relatively much shorter, broader and heavier than in the latter, with the postpalatal region correspondingly shorter and wider. The short, thick tail also contrasts strongly with the attenuate tail of *Herpestes*.

Xenogale microdon sp. nov.

Type, No. 51625, ♂ ad., Akenge, Belgian Congo, December 4, 1913; Herbert Lang and James P. Chapin, American Museum Congo Expedition. Original No. 2194.

Small-toothed, with a general external resemblance to the *Atilax* group.

Upper parts of body with the overhair black broadly annulated with rufous, giving a grizzled effect of deep black and ochraceous orange; the individual hairs are light at base passing into black, the outer half black ringed and tipped with ochraceous or wholly black; underfur pale buff, darker at extreme base; tail like the back at base, becoming lighter apically without distinctive change (to black or white) at tip, the hairs individually buff at base, broadly ringed with black near the middle and subapically ringed with whitish; limbs uniform brownish black to intense black (in different individuals); head distinctly lighter than body, the hairs short and conspicuously tipped with whitish, giving a grizzled grayish effect; ventral area similar to the back but more suffused with rufous which prevails over the black; foreneck from the axillar line to lower part of the throat blackish the hairs conspicuously tipped with whitish, giving a grizzled effect; chin, sides of head and top of nose with a brownish tone, the hairs extremely short; palms and soles bare as in *Ichneumia*. (A fuller description, with detailed measurements and illustrations of cranial and external characters, will appear in the final report on the Congo Carnivora.)

THE GENERIC NAMES MUNGOS AND HERPESTES

The specific name *mungo* dates from Gmelin, 1788 (Syst. Nat., I. p. 84), *Viverra mungo* being the second species of his genus *Viverra*. His *Viverra mungo* was based primarily on the banded mongoose of Africa, although the habitat is given as India, and references to various indeterminate Asiatic species are included among his bibliographic citations under *V. mungos*.

As no diagnosis is given by which the species can be identified it must be determined by the first identifiable reference. The first reference is "Schreber, Säugethiere, III, p. 430, t.CXVIA, CXVIB." Schreber's plate CXVI is an accredited copy of Buffon's figure of "La Mangouste." Buffon and Daubenton supposed that their specimens

came from India, but no definite place of origin is mentioned for any of the several specimens mentioned by them. Hence for the next half century Buffon's "La Mangouste" was believed to be an Indian species. It was not till 1835 that Daubenton's plate and description were recognized as based on the banded mongoose of Africa, currently known in technical literature as *Crossarchus fasciatus* (Desmarest).

In 1803 E. Geoffroy, in his 'Catalogue des Mammifères du Museum nationale d'Histoire naturelle' (Paris), redescribed 'La Mangouste' of Buffon and Daubenton *from the specimen which served as the basis of the original description*, under "La Mangouste de l' Inde, *Ichneumon mungo*," giving its distinctive characters as "Pelage varié de roux et de noir, par zones transversales; queue pointue; pieds pentadactyles." Among his citations are "La Mangouste, Buff. Daubt. t. 13, pp. 150–160, pl. 19;" "*Viverra mungo*, Schreber, tabl. 116;" "*Viverra mungo*, Lin. Gmel., p. 84, pl. 7." Then follows a detailed description, its "patrie" ("Les indes orientales"), the number of the specimen in the catalogue of the Museum ("No. ccxxiv"), followed by the remark: "Individu qui a servi de sujet pour la descript. prècédente, et celle de Buffon." The identity of the original La Mangouste is thus thoroughly established.

Desmarest, in his 'Mammalogie' (I, 1820, p. 211), gave essentially the same description, based doubtless on the original type-specimen, under the names "Mangouste à bandes, *Herpestes mungo*." Three years later (Dict. Sci. nat., XXIX, 1823, p. 58) he changed the technical name to *Herpestes fasciatus*, because the name *mungo* was not "classical." He repeats the geographical error: "La mangouste à bandes est particuliére à l'Inde." Fischer (Syn. Mamm., 1829, p. 163), six years later, under *Mangusta mungo*, says: "Hab. in India orientali." In fact, the real habitat of La Mangouste, alias Mangouste à bandes, was first made known by Ogilby in 1835, when in an account of a collection of mammals collected in Gambia (Proc. Zool. Soc. London, 1835, 101), he says: "Mr. Rendall has brought over specimens of two *Herpestes*, one of which, the *Herpestes Mongos* of Linnæus, very well figured and described by Buffon (Hist. Nat., tom. xiii, tab. 19), deserves to be noticed, for the purpose of correcting the habitat of the species, which, upon Buffon's authority, has hitherto been given as India, but which Mr. Rendall's specimens clearly show to be the west coast of Africa. The mistake originally arose from Buffon's having identified the *Mangouste à bandes*, the species under consideration, with the *Mongos* of Kæmpfer, unquestionably an Indian

species (the *Herpestes griseus* of authors), and still commonly called by that name in Upper India, where many natives and Europeans keep it in a semidomestic state, for the purpose of destroying vermin. . . . . "

Thomas, in 1882, in his important paper 'On the African Mongooses' (Proc. Zool. Soc. London, 1882, pp. 59–93, pl. iii) said, under *Crossarchus fasciatus* (l. c., p. 91): "This species by its locality, and not *C. zebra*, no doubt represents the early-known '*Viverra mungo*' which was said to come from the 'East Indies.' No cross-striped Mungooses, however, are known from India, and the original specimens must have been obtained from the Cape. . . . . Probably, however, tame examples were sometimes brought down to Capetown, where they would be seen by the earlier travellers." Thomas was so fully convinced that the *Viverra mungo* Gmelin is the *Crossarchus fasciatus* of later writers that he felt called upon to explain in a footnote his reason for ignoring the rule of priority in this case and accepting *fasciatus* instead of *mungo*, as follows: "This name '*mungo*' is so utterly barbarous, and that of *fasciatus* so well known, that I think we are justified in ignoring it and using Desmarest's classical and appropriate term" (l. c., footnote to p. 90).

The status of *Viverra mungo* (= La Mangouste of Buffon and Daubenton) has a vital bearing on the correct application of the generic name *Mungos*, revived in 1907 to replace *Herpestes* Illiger (1811). It also has an equally important bearing on the specific name of the 'Common Mongoose' of India.

The genus *Mungos*, like many of the early genera of post-Linnean origin, was introduced rather informally and without much detail by E. Geoffroy and G. Cuvier in their 'Memoire sur une nouvelle division des Mammifères' in the 'Magasin Encyclopédique' in 1795. This memoire is stated by the authors to be merely a sketch or outline to be amplified later, and that some of the genera are presented provisionally. The higher groups are only briefly characterized, and their content indicated by an enumeration of the genera, designated only by vernacular names, followed by technical names in parentheses, of the species respectively referred to them. The following are examples from the Plantigrades (l. c., p. 184): " . . . . . les ours (*ursus*, L.); les ratons (*ursus lotor*, L.); les coatis (*viverrae nasua, narica, tetradactila et vulpecula*, L); les blaireaux (*ursus meles*, etc); . . . . . les mangoustes (*viverra ichneumon et mungos*): . . . . ."

The 10 genera referred to the Plantigrades follow in a single column, the vernacular names standing first and the technical equivalent following it in parenthesis, thus:

"Ours (*Ursus*).	Coati (*Nasua*).
Raton (*Lotor*).	Kincajou (*Potos*).
Glouton (*Gulo*).	Taupe (*Talpa*).
Blaireaux (*Taxus*).	Musaraigne (*Sorex*).
Mangouste (*Mungos*).	Hĕrrisson (*Erinaceus*)."

Four of these genera are credited to Linne; two (*Gulo, Nasua*) date from Storr (1780); the other four (*Lotor, Taxus, Mungos, Potos*) first appear here, but two of them are antedated by names given by Storr (*Lotor* by *Procyon*, *Taxus* by *Meles*), leaving two, *Mungos* and *Potos*, both in current use. *Potos* was monotypic, with "*Viverra caudivolvula*, L." as type. *Mungos* contained two species, *Viverra ichneumon* Linné and *Viverra mungo* Gmelin. *Viverra mungo* is therefore automatically the genotype of *Mungos*. Furthermore, *Viverra mungo* is not a species of *Herpestes* Illiger (type, *Viverra ichneumon* Linné, by several "subsequent designations"), it being noncongeneric with the genotype of *Herpestes*.

As already shown 'La Mangouste' of Buffon and Daubenton is the banded mongoose of Africa, the *Crossarchus fasciatus* of current nomenclature, which should henceforth bear the name *Mungos mungo* (Gmelin). *Ariela* Gray (1864) is a synonym of *Mungos*, having been especially founded for the South African banded mongoose (*Ichneumon tænionotus* A. Smith) under a misapprehension of its real characters. *Mungos* of Gray (Proc. Zool. Soc. London, 1864, pp. 575–577), it singularly happens, is essentially the *Mungos* of Geoffroy and Cuvier, although Gray apparently knew nothing of the *Mungos* of these earlier French authors, this agreement being apparently a coincidence. Under his *Mungos fasciatus* Gray placed *Herpestes mungo* Desmarest, thus rendering this species, under modern rules, automatically the genotype of his genus *Mungos*.

The restoration of *Mungos* to its proper place in nomenclature need not in the least disturb the stability of *Crossarchus* F. Cuvier (1825), which has, by monotypy, *Crossarchus obscurus* F. Cuvier as its genotype, for which and later described allied forms it should be retained. As thus restricted *Crossarchus* forms a group very different from the banded mongooses for which *Mungos* is available and to which it should be restricted. Gray showed good judgment in separating the two

groups generically. Attention has recently been called to the generic distinctness of these groups by Pocock[4] he adopting for the banded mongooses Gray's unavailable name *Ariela*. He also calls attention to the fact that the inclusion of the two groups under *Crossarchus* was due to erroneous information concerning the structure of the anal glands. Before meeting with Pocock's paper I had become strongly impressed with their incongruity and their evident generic distinctness.

Herpestes Illiger (1811), genotype,[5] *Viverra ichneumon* Linné, after almost universal employ for three fourths of a century, was hastily and, as it now appears, needlessly displaced in 1907[6] by *Mungos* Geoffroy and Cuvier and immediately the latter became current for the greater part of the mongooses of both Africa and Asia. It should now be returned to its time-honored place in nomenclature, through the allocation of *Mungos* to its proper station.

As already shown, not only is *Mungos* untenable as a genus name for any Indian mongoose, but also the species name *mungo* is equally a misnomer when applied in the same connection, it belonging unquestionably to the banded mongoose group of Africa.

A NEW SUBSPECIES OF BEAVER FROM NORTH DAKOTA

By Vernon Bailey

In attempting to identify the beavers of North Dakota, for inclusion in my report on the mammals of the State, I find it necessary to apply a new subspecific name to those occupying the Missouri River drainage. Strange to say the specimens show closer affinity with those of the Rio Grande drainage, than with those in the same State in the streams flowing into Hudson Bay. Under permit from the State Game Commission, I was allowed to collect two specimens in Apple Creek, about 7 miles east of Bismarck, and there are a number of additional skulls from along the Missouri and Little Missouri Rivers. While it is very desirable to obtain more material, and especially skins taken at

[4] On the severance of *Ariela* Gray (= *Mungos* s.s.) from *Crossarchus* see Pocock, Proc. Zool. Soc. London, 1916, p. 350 and text figures on pp. 353, 356, 360, 369.

[5] By subsequent designation, Anderson, Yunnan Exped., 1878, p. 171; Thomas. Proc. Zool. Soc., 1882, p. 63.

[6] Cf. Thomas, Ann. Mag. Nat. Hist. (7), XX, p. 119, footnote.

different seasons of the year, the specimens available at present are sufficient to show reliable characters. A much more extended study will be necessary to determine the limits of range of this form and whether it conforms strictly to the drainage system of the Missouri River or only a part of it. The form may be known by the following description:

Castor canadensis missouriensis subsp. nov.

Type from Apple Creek, 7 miles east of Bismarck, North Dakota. Male, immature, No. 205763, U. S. National Museum, Biological Survey Collection. Collected September 1, 1914, by Vernon Bailey. Original No. 9,703.

General characters:—Slightly smaller than *canadensis* and much paler and duller brown. Skull more triangular in outline, not so massive and heavy; much like that of *mexicanus*, shorter and heavier than that of *frondator*. From *mexicanus* the colors differ in being noticeably duller and darker; from *frondator*, duller, and not so rusty.

Color of type specimen in fresh short September fur, back from nose to tail, rich hazel brown; duller on sides, and more yellowish on sides of face and neck; lowerparts smoky grayish brown, with a touch of light chestnut at base of tail and over tops of feet. Young of year almost exactly the same in coloration. Specimens from the Yellowstone Park (Yanceys), in long winter fur, are slightly brighter hazel over the back, but very similar otherwise.

Skull of type specimen not sufficiently developed for fair comparison with old individuals, but agreeing in general characters with adults from the same region. A fully adult skull in the National Museum Collection, No. 2377, labeled "Upper Missouri, Lieutenant Warren," and another good skull from old Fort Stevenson (McLean County), also show the triangular shape, light structure, and narrow interorbital region of this form.

Measurements of type in the flesh (probably 18 months old and not fully grown)—Total length, 900; tail, 270; hind foot, 170; naked part of tail, length, 230, width, 130 mm. Skull, basal length, 110; nasals, 41 (22.4 wide); zygomatic width, 87; mastoid width, 60; interorbital width, 21; postorbital width of brain case, 45; alveolar length of upper molar series, 27.5 mm. Measurements of skull No. 2377, U. S. National Museum Collection, from Upper Missouri, basal length, 130; nasals, 49; zygomatic width, 102; mastoid width, 67; interorbital width, 25; postorbital width of brain case, 48 alveolar length of upper molar series, 32 mm. Weight of type specimen estimated at 35 or 40 pounds.

NAMES OF SOME SOUTH AMERICAN MAMMALS

By Wilfred H. Osgood

Among required nomenclatural changes revealed in the preparation of a list of the technical names of South American mammals are the following to which it seems desirable that attention be called as early as possible.

Euphractus sexcinctus flavimanus Desmarest

Tatou poyou ou Tatou a main jaune Azara, Quad. Paraguay, II, p. 142, 1801.
Loricatus flavimanus Desmarest, Nouv. Dict. d'Hist. Nat., xxi, p. 433, 1803 (common name); ibid, xxiv, Tab. Meth. Mamm., p. 28, 1804.
Dasypus flavipes Fischer, Zoognosia, III, pp. 122–124, 1814.
Dasypus gilvipes Illiger, Abhandl. K. Akad. Wiss., Berlin (1811), p. 108, 1815-nomen nudum; Lichtenstein, Abhandl. K. Akad. Wiss., Berlin (1814–15), p. 215, 1818.
Dasypus sexcinctus gilvipes Thomas, Ann. & Mag. Nat. Hist., (7), xx, p. 165, 1907.
Euphractus sexcinctus gilvipes Allen, Bull. Am. Mus. Nat. Hist., xxxv, p. 564, August 9, 1916.

The name *gilvipes*, now in use for the Paraguayan form of the six-banded armadillo, is antedated by two others, *flavipes* Fischer, 1814, and *flavimanus* Desmarest, 1804. The proper name for this form, therefore, is *Euphractus sexcinctus flavimanus* Desmarest.

Tolypeutes matacus Desmarest

Tatou huitième, ou Tatou mataco Azara, Quad. Paraguay, II, p. 197, 1801.
Loricatus matacus Desmarest, Nouv. Dict. d'Hist. Nat., xxiv, Tab. Meth. Mamm., p. 28, 1804.
Tolypeutes conurus Geoffroy, Rev. Zool., Paris, p. 137, April 1847; Comptes Rendus, xxiv, p. 575, January–June, 1847.

If the mataco of Azara is distinct from the Linnaean species (*tricinctus*), the name *conurus* should be replaced by *matacus* of Desmarest which has many years priority.

Zaëdyus pichiy Desmarest

Tatou septieme, ou Tatou pichiy Azara, Quad. Paraguay, II, p. 192, 1801.
Loricatus pichiy Desmarest, Nouv. Dict. d'Hist. Nat., xxiv, Tab. Meth. Mamm., p. 28, 1804.

Dasypus ciliatus FISCHER, Zoognosia, III, p. 127, 1814.
Dasypus patagonicus DESMAREST, Nouv. Dict. d'Hist. Nat., xxxii, pp. 491–492, 1819.
Dasypus minutus DESMAREST, Mamm., II, p. 371, 1822.
Euphractus marginatus WAGLER, Natürl. Syst. d. Amphibien, p. 36, 1830.

Of the three names given by Desmarest to the pichiy armadillo, the latest, *minutus*, is found most frequently in literature while the earliest, *pichiy*, seems to have been entirely overlooked. The name *minutus* has of late been replaced by *ciliatus* of Fischer, but this should give way to *pichiy*. A further synonym, rarely cited, is *Euphractus marginatus* Wagler, also based on Azara.

Cavia tschudii arequipæ nom. nov.

Cavia tschudii pallidior THOMAS, Ann. & Mag. Nat. Hist., (8), xix, p. 158, January, 1917—not *Kerodon niata pallidior* Thomas 1902 [= *Cavia* (*Monticavia*) *niata pallidior*].

If *Monticavia* be regarded as no more than a subgenus of *Cavia*, then *C. t. pallidior*, 1917, is preoccupied by *K. n. pallidior*, 1902, and requires a new name. Mr. Thomas, who proposed both names, treats *Monticavia* as a full genus and therefore would make no change, but for those who wish to be consistent in opposing the recognition of slightly characterized groups as full genera, action as above is demanded

Canis australis Kerr

Antarctic Fox PENNANT, Hist. Quad., I, p. 240, 1781.
Canis vulpes australis KERR, Anim. Kingd., p. 144, No. 259, 1792.
Canis antarcticus BECHSTEIN, Uebers. Vierf. Thiere Pennant, I., p. 271, footnote, 1799; SHAW, Gen. Zool., I, p. 331, 1800.
Canis (*Pseudalopex*) *australis* ALLEN, Bull. Am. Mus. Nat. Hist., VII, p. 188, June 20, 1895.
Canis antarcticus ALLEN, Mamm. Patagonia, p. 153, Apr. 28, 1905.
Dusicyon antarcticus THOMAS, Ann. & Mag. Nat. Hist., (8), XIII, pp. 353–354, March, 1914.

Although Allen in 1895 (l. c.) called attention to the priority of Kerr's name *australis* for the Falkland Island dog, the name has not been brought into use. Even Allen himself in 1905 (l. c.) fails to mention it and uses *antarcticus* of Shaw in discussing the subgeneric position of the species. Since its basis is identical with that of *antarcticus*,

it must be adopted and the type locality may be regarded as West Falkland Island to agree with the selection made by Thomas for *antarcticus* in 1914 (l. c.).

Chrysocyon brachyurus Illiger

Agouara-gouazou Azara, Quad. Paraguay, I, p. 307, 1801.
Canis brachyurus Illiger, Abhandl. K. Akad. Wiss., Berlin, (1811), pp. 109, 121, 1815.
Vulpes cancrosa Oken, Lehrb. d. Naturgesch., III, Zool., pp. 1036–1037, 1816.
Canis jubatus Desmarest, Mamm., I, pp. 198–199, suppl. pl. 6, fig. 1, 1820.
Canis campestris Wied, Beitr. Naturg. Bras., II, pp. 334–338, 1826.
Canis isodactylus Ameghino, Anales Mus. Nac. Buenos Aires, (3), VI, pp. 9–14, 1906.

As indicated above, the red wolf or maned wolf of southern Brazil, Paraguay, and northern Argentina should be called *Chrysocyon brachyurus*. The current name *jubatus* is antedated not only by *brachyurus* of Illiger but also by *cancrosa* of Oken and since all three are based on Azara, there can be no question as to the necessity of adopting the earliest.

C. campestris Wied was practically a substitute for *jubatus* on grounds of greater appropriateness. *C. isodactylus* Ameghino, as noted by Winge and Ihering (Rev. Mus. Paulista, viii, pp. 205–206, 1911), also appears to be a synonym.

Tayra barbara sinuensis Humboldt

Mustela sinuensis Humboldt, Rec. d'Obs. Zool. Anat. Comp., I, pp. 347–348, 1812 (not later than August 7).

This name, based on specimens from the mouth of the Rio Sinu, Bolivar, Colombia, appears to have been overlooked. Whether it should displace a name already in use is uncertain, without specimens from the type locality. This locality lies almost equidistant from the Veragua District of Panama from which *T. b. biologiæ* Thomas, 1900, was described and the Santa Marta District of Colombia from which comes *T. b. irara* Allen, 1904.

Cebus xanthosternos Wied

Simia variegata Humboldt, Rec. d'Obs. Zool. Anat. Comp., I, pp. 356, 362, 1812 (not later than August 7)—not *Simia* (*Sapajus*) *variegatus* Kerr, Anim. Kingd., Mamm., p. 79, No. 77, 1792 [= *Saimiri* sp.?].

Cebus variegatus GEOFFROY, Ann. Mus. d'Hist. Nat. Paris, xix, p. 111, October, 1812.

Cebus xanthosternos WIED, Reise nach Brasilien, I, p. 371, footnote, 1820; KUHL, Beitr. Zool. vergl. Anat., p. 35, 1820; WIED, Beitr. Naturg. Bras., II, pp. 90–97, 1826—Boca d'Obu, near Belmonte, Bahia, Brazil.

Simia variegata Humboldt, as shown by Sherborn and Thomas (see Ann. & Mag. Nat. Hist., (8), xii, p. 567, footnote, 1913), antedates *Cebus variegatus* Geoffroy. It is preoccupied by *Simia* (*Sapajus*) *variegatus* Kerr which refers to an unidentifiable squirrel monkey received from Antigua. The next available name seems to be *Cebus xanthosternos* Wied, 1820.

NOTES ON THE FOX SQUIRRELS OF SOUTHEASTERN UNITED STATES, WITH DESCRIPTION OF A NEW FORM FROM FLORIDA

BY ARTHUR H. HOWELL

The fox squirrels, throughout the greater part of their range in southeastern United States, dwell almost exclusively in open pine forests. In the mountainous regions of northern Alabama they are found to some extent in mixed timber (oaks, hickories, pines, etc.), and in central and southern Florida they inhabit also cypress swamps. On the southwest coast of Florida a well marked form has developed in the damp, dark forests of black- and red-mangrove which extend practically without a break from Marco Pass to Cape Sable and around the southern end of the peninsula to the shores of Biscayne Bay on the east coast.

In this region the animal is known as the 'black mangrove squirrel' and is said to be not uncommon. Several days spent in hunting through these mosquito-infested forests resulted, however, in seeing only one of the squirrels, which escaped before I could get a shot at it. The type was secured for me by an Indian boy, who knew where its home tree was located. Another specimen, examined while at Everglade, agreed closely with the type.

The National Museum collection (including that of the Biological Survey) contains a large series of fox squirrels from various parts of Florida and a few from southern South Carolina—the type region of *Sciurus niger*. Through the courtesy of the authorities of the Museum

of Comparative Zoology, I have been enabled to examine, also, a fine series of 12 specimens from the coast region of Georgia (Barrington and Hursman's Lake).

Typical *Sciurus niger* is subject to great variation in color and exhibits three well-marked color phases. These may be called the gray phase, the buff phase, and the black or melanistic phase. The gray phase, in its extreme form (specimen from Georgetown, S. C., in Biological Survey Collection) is pale smoke gray above, including the tail, and white beneath. The crown is black or blackish and the nose, ears, and feet white. Some specimens in this phase have the feet and under side of tail buff, thus approaching the next darker phase. In the buff phase, the general tone of the upperparts is pinkish buff, the underparts, feet, and underside of tail rich cinnamon-buff or clay color. Numerous intermediate specimens connect this phase with the gray phase. The black or melanistic phase—well-known as occurring frequently in many species of squirrels—is wholly or partly black or dark brown, except the nose and ears, which are white. The large series from northern and middle Florida agrees quite closely with the series from South Carolina and Georgia except that the gray individuals are darker above and tinged with buff below. Both the gray and the buff phases are represented, the latter, however, more numerously.

The new race is much deeper colored than any of the series of *niger;* it is apparently restricted in its typical form to the mangrove swamps, for numerous specimens examined from the pine and cypress forests of Lee and Dade counties, Florida, are variously intermediate between *niger* and *avicennia*, many of them indistinguishable in color from *niger*, although always smaller.

Sciurus niger avicennia[1] subsp. nov.

MANGROVE FOX SQUIRREL

Type, No. 231498, U. S. Natl. Mus., Biological Survey Collection; ♂ adult, skin and skull, from Everglade, Lee County, Florida; collected March 14, 1919, by A. H. Howell; original number 2325.

Characters.—Similar to *Sciurus niger niger* but decidedly smaller; coloration much darker (more tawny) both above and below; feet clearer white (less tinged with buff).

[1] In allusion to its favorite haunts in forests of black mangrove (*Avicennia nitida*).

Description of type.—Nose, lips, and front of face white; ears white, with a patch of cinnamon-buff at base; head and fore back black, sprinkled with cinnamon; hinder back cinnamon, shading on sides to orange-cinnamon; front legs blackish, washed with orange-cinnamon, the feet and toes white, faintly shaded with buff; hind legs orange-cinnamon shaded with black; hind feet blackish, mixed with grayish white and broadly edged with whitish; toes white; thighs with a long black patch on outer side; tail above, orange-cinnamon, mixed with black (the bases of the hairs black) shading on sides to hazel; under surface of tail rich tawny, the hairs with a subterminal band of black; terminal central portion of tail white for about 3 inches; underparts dull orange-cinnamon, washed on throat and breast with black and white.

Measurements.—Type (adult ♂): Total length, 535; tail vertebrae, 260; hind foot, 75. *Skull.*—Occipito-nasal length, 65.5; zygomatic breadth, 37.4; mastoid breadth, 25.4; interorbital breadth, 20.6; least postorbital breadth, 19.5; length of nasals, 25.2; maxillary tooth row, 13.

GENERAL NOTES

THE GEORGIAN BAT, PIPISTRELLUS SUBFLAVUS, IN WISCONSIN

Under the name *Scotophilus georgianus*, *Pipistrellus subflavus* (F. Cuvier) was recorded from Wisconsin by Strong who merely listed it without exact locality or date of capture (Geol. Wisconsin, Survey of 1873–1879, vol. 1, p. 438, 1883). In view of the fact that Strong apparently treated in a like manner all the bats known from eastern and northern states without having local records, Hollister rightly considered this one not to be entitled to a place in the Wisconsin list (Bull. Wisconsin Nat. Hist. Soc., vol. 8, p. 31, 1910). It is of more than local interest to place on record a skin and skull (No. 229219, U. S. National Museum, Biological Survey collection) of an adult male of this species collected by the writer, August 29, 1918, at Devil's Lake, in the Baraboo Range, Sauk County, Wisconsin. It was shot in the dusk of late evening as it was flying over a narrow road through heavy deciduous woods at the base of rugged and rocky hills.

—*Hartley H. T. Jackson.*

IS THE JAGUAR ENTITLED TO A PLACE IN THE CALIFORNIA FAUNA?

Several of the early voyagers who touched in California enumerate the jaguar (*Felis onca*) among the native mammals. Thus, in the early part of the last century Langsdorff mentions it as among the species occurring in the Monterey region (*Voyage and Travels*, II, 213, 1814). And Beechey, in describing the region between San Francisco and Monterey, under date of December, 1826, says: "The lion (*felis concolor* ?) and the tiger (*felis onca* ?) are natives of these woods, but we never saw them; the inhabitants say they are small, and that the lion is less than the tiger, but more powerful." (*Beechey's Narrative*, Vol. 2,

p. 79, 1831). In this connection it should be observed that to this day the Spanish Californians and Indians invariably apply the term 'lion' to the mountain lion or cougar. A little later Saint-Amant, in a work published in Paris in 1854, recorded the jaguar as a California mammal. (*Voyages en Californie et dans l'Oregon*, p. 537, 1854).

It has been customary to look askance at these early records, but the detailed account of a family of jaguars seen repeatedly in the Tehachapi Mountains by James Capen Adams, as recorded by the late Judge Theodore Hittell, is so circumstantial as to admit of no question as to the identity of the animal. Adams either saw a pair of jaguars and their young, or he lied out of whole cloth. While neither the date nor the exact locality are stated, we are told that Adams, after leaving the Tejon and traveling over a rough mountainous country, camped at a spring in a gorge facing the Great Basin. The rough mountainous country traversed was of course the Tehachapi Mountains, and the part of the Great Basin looked out upon must have been the western part of the Mohave Desert.

The first night of his stay at the spring he was awakened by a fearful snuffing and snorting among his animals and saw in the darkness two spots like balls of fire, which he recognized as the eyes of the beast that had frightened his horses. The next day, taking his hunting companions—a tame grizzly named 'Ben' and his dog 'Rambler'—he followed the trail of the animal for four or five miles to another gorge, where he finally located the den in a cave on the side of a cliff in an exceedingly rough and inaccessible place. "In its mouth, and scattered below it, were multitudes of bones and skeletons of various kinds of animals, and among others, of Mountain Sheep, making the place look like the yard of a slaughter-house."

A few nights later he was wakened by a roar, and in the feeble light of a new moon saw "a spotted animal, resembling a tiger in size and form, with two young ones." Another night, soon after dark, the male appeared at the mouth of the den, "looked around, and sniffed the air, and then leaped down, and going a few yards placed his paws upon a rock, and stretched himself, yawning at the same time as if he were waking up out of a sleep. A few minutes afterwards the female appeared, and approaching, lapped his brawny neck." The male, as nearly as could be seen, "was twice as large as the ordinary cougar, and appeared to be covered with dark round spots of great richness and beauty."

For several weeks Adams continued his fruitless attempts to trap or kill the animals, obtaining from time to time passing glimpses of them, until finally he unexpectedly came across the mother and cubs in a gorge far away from the den. He fired at her, whereupon his grizzly 'Ben' and dog 'Rambler' bounded forward and "engaged with her in a terrific combat, but she tore them dreadfully and managed to escape." (*Adventures of James Capen Adams, Mountaineer & Grizzly Bear Hunter of California*, by Theodore H. Hittell, San Francisco, 359–369, 1860).

Since writing the above, Vernon Bailey has called my attention to an old record by Pattie, which I read many years ago but had forgotten. Pattie states that when on islands in the delta of Colorado River, they killed an animal like an African leopard which came into their camp, and was the first of its kind they had ever seen (James O. Pattie, Personal Narrative, Cincinnati, 1833).

Still another bit of evidence comes from the Indian tribes of Southern California. An old chief of the Kammei tribe (called by the Spanish 'Diegenos') told me that in the Cuyamaca Mountain region in San Diego County, the 'Tiger,' while rare, was well known to the old Indians, who call it the "Big-spotted Lion," *Hut'-tē-kul'*[CH].

—*C. Hart Merriam.*

AN EASY METHOD OF CLEANING SKULLS

One of the chief factors which deter ornithologists from taking up mammalogy is the lack of a standard method by which skulls may be cleaned quickly and in a satisfactory manner. All of the old published information in regard to maceration and boiling is of a very hazy character, and there are few of us who have not ruined valuable material while trying these methods.

The writer has been especially interested in the preparation of skulls and skeletons, and has not only tried every method of which he could learn, but has experimented and tested many modes of procedure which held even slight prospect of success. My experience has made me very skeptical of employing chemicals, for one cannot be sure of their future effects on skulls. Although some of them apparently are satisfactory for the present, we have no means of being sure that they will not have destroyed the skulls within twenty or thirty years, and it would be nothing short of a calamity if the types of today are not preserved for far longer than that. Usually the skull is of more importance than the skin, and much care should be employed in its preparation.

The cleaning of a skull really begins when the animal is skinned. As soon as the skin is turned right side out, the skull should be detached from the body, the tongue and flesh between the lower jaw and the muscles below the zygomata carefully cut away, a durable tag with waterproof ink attached, the brains removed with a syringe, and the skull dropped into a jar of denatured alcohol. The latter will replace the water in the skull and "dry" it at once, and the skulls can be removed in a couple of days, or left indefinitely. It is of the greatest importance to dry all skulls quickly (but not by artificial heat), for if decomposition once starts, the sutures are loosened, and this can never be remedied in the future. If one has no alcohol at hand, drop the skulls into a can of water for a couple of days, after which dry them as soon as possible. The water will soak out most of the blood, and the finished specimen will be much whiter. Needless to say, the alcohol does this also. If the skulls become infested with maggots, pour a little gasoline or alcohol over them, or soak for an hour in water, but *never* pour boiling water over them, for the sudden change in temperature will crack the canines of the carnivores, and render the molars of some rodents so brittle that they continually break off.

At home I keep a large jar of naphtha into which I place all skulls which are dry. I am not sure that this is necessary after the alcohol bath, but it finishes the process of degreasing, and greaseless skulls will turn out several hundred per cent whiter than those which have not been so treated. I take them out of the naphtha several days before I intend finishing them, or long enough ahead for the liquid thoroughly to evaporate.

Take a batch of skulls of the same size and place them in soft water—use distilled water if that from the tap is hard. Soak an hour for shrews and the smallest bats, six hours for mice, twelve for rats, and twenty-four for larger forms. They should be soaked slightly longer during cold weather than in summer, or in a warm room. Next prepare a one per cent solution of hydrogen peroxide—two parts of water and one of the commercial product,—put the skulls into a small covered pan and pour on just enough of the liquid to float them. Place on a stove and time from when the boiling point is reached—three minutes for shrews and small bats, eight or ten minutes for mice, fifteen for rats, and longer in proportion for larger species. One must not fail to cook skulls of juveniles for a shorter time than those of adults. At the expiration of the cooking period, place the pan under a trickle of cold water until fully cooled. Remember never to douse cold skulls in hot water nor hot skulls in cold. The skulls, especially the larger ones, may be left for twenty-four hours as they now are, but I always like to begin work on them at once. The instruments which I have found to be of most help in the actual cleaning are two knife blades, one of them the smallest which can be procured, and the other a trifle larger fine tweezers, fine scissors, and an embryo hook or bent pin for removing bits of brain. The rest is patience, perseverance and great care.

By this method I can clean a dozen or more small skulls an hour, and so perfectly that not one zygomatic arch in a hundred will be broken, nor a lower jaw disarticulated. If I cooked them longer, I could do much faster work, but the sutures would be loosened, and I would not have any skulls of mine cooked to the point where twenty-five or thirty could be cleaned in an hour.

If these instructions are followed, the skulls will dry out as white as one could wish, the smaller ones especially, absolutely free from blood stains, all sutures firm and in such condition that they should last indefinitely. Also, there is no chemical present to work possible harm, for the peroxide is more of a mechanical mixture than a chemical one. In the case of skulls of coyote and larger, it is probably advisable to soak in melted paraffine and dry in a moderate heat. This closes the pores and prevents the teeth from splitting, but it will detract somewhat from their appearance. Skulls may be bleached snow white, but in a large working collection, this is hardly advisable, for the sutures are then almost invisible, and comparative work is done with considerable difficulty.

—*A. Brazier Howell.*

WHY SHOULD EVERY SPECIMEN BE NAMED?

The desire on the part of museum curators and others to identify and label the specimens that come into their possession is natural and commendable, but like many other good things may be carried too far.

In the course of my personal experience—and doubtless the same is true of others—I have been urged by professional naturalists to name specimens which to my mind were unidentifiable. A name was demanded to put on the label, and the mere fact that the specimen could not be satisfactorily identified was set aside as of minor consequence. The cry was, "What are you going to call it? Give it a name. What name shall we write on the label?" And I have known naturalists of reputation, in revising groups, to write names on the labels

of many specimens that could not be referred with certainty to any species. To my mind this is bad science, bad example, and bad morals.

Specimens of mammals and birds are subject to several conditions and vicissitudes, any one of which may render identification doubtful if not positively erroneous. Among these may be mentioned immaturity, poor or imperfect condition, worn pelage or plumage, intermediate position between two or more described forms, or—most distressing of all—peculiarities exhibited by the single specimen from a remote locality—a specimen which, until others are received, cannot be satisfactorily disposed of, either by referring it to an unknown geographic race (subspecies) or by regarding it as a case of individual or fortuitous variation, thus leaving the author's best judgment enshrouded in doubt.

The pernicious practice—one might say mania—of naming every specimen is a stumbling block in the progress of science and is particularly unfortunate when done by the revisor of a group, whose authority is accepted by students. For students naturally adopt as final the determinations they find in the handwriting of the expert, regarding specimens so labeled as typical of the species or subspecies whose names they bear. But as a matter of fact many of the specimens so labeled are not only not typical, but are either unidentifiable, or so exactly intermediate between the species in question and some other, that the name of the other would be equally applicable.

In this connection, a recent protest by P. A. Taverner of the Geological Survey of Canada is worth repeating. He says: "The truth is, we cannot with absolute certainty identify every specimen we study. Why then deceive ourse ves and mislead others by making a bluff at doing the impossible? Why not own up honestly and admit that we cannot name such material? We may state that we think it is so and so and where necessary give reasons for the conclusion, but to pass as fact what is only opinion is not the spirit of modern science." (*The Auk*, Vol. 36, No. 2, p. 317, April, 1919.)

—*C. Hart Merriam.*

RECENT LITERATURE

(Received since April 1, 1919)

Hollister, N. EAST AFRICAN MAMMALS IN THE UNITED STATES NATIONAL MUSEUM. Bulletin 99, U. S. Nat. Mus. PART I. INSECTIVORA, CHIROPTERA, AND CARNIVORA. Pp. 1–194, text fig. 1–3, pls. 1–55, August 16, 1918. PART II. RODENTIA, LAGOMORPHA, AND TUBULIDENTATA. Pp. i–x, 1–184, text fig. 1, pls. 1–44, May 16, 1919.

This work, as represented by the two parts that have appeared, is a critical list of 349 species and subspecies of East African mammals contained in the United States National Museum and comprising the majority of those known. The third part, as yet unpublished, will include the primates and ungulates, and the whole will thus form the nearest approach to a technical compendium of the mammals of this part of the world that can reasonably be hoped for at this time. The area covered by the list is an arbitrary one including the political divisions of Sudan, Somali, Abyssinia, Uganda, British East Africa, and German East Africa. The treatment is largely critical and technical, serving to coordinate a great part of the scattered work that has been done in recent years. Besides lists of localities for each species, there is much miscellaneous biological data mainly from the field notes of the collectors, and with each group of species there is an extensive table of measurements of individual specimens, including a large number of types. The extent and value of these tables may be indicated by noting that for two subspecies of lions cranial and dental measurements are given for no less than forty-six specimens. Another feature of great usefulness is found in the half-tone plates of the skulls of type-specimens including all those possessed by the Museum, sixty-three in Part I and seventy-five in Part II. Most of these are shown in natural size and in two, or frequently three, aspects. Those of Part I are uniformly of very high quality and, taken in connection with the measurements, furnish a basis for comparison closely approximating that of the specimens themselves. Those of Part II are in a number of cases not so well executed as those of Part I.

The labor connected with such a list as this is prodigious and, as the author states, it involves "what amounts to monographic work in each group and careful identification of every specimen." That it has been exceedingly well done is very evident to anyone having even a slight acquaintance with the field it covers. The specimens upon which the list is based were mostly obtained in recent years principally by two expeditions, the Smithsonian African Expedition led by Colonel Roosevelt and the Paul J. Rainey Expedition, both of which were accompanied by that experienced and successful collector, Edmund Heller. They illustrate in a most convincing way the value of modern methods, of trained workers, and of concentrated attack on a particular field. Of the 349 forms listed, 223, or 63 per cent, have been discovered and described in the last ten years. Only 81, or 20 per cent, were known prior to the year 1900. The total number of specimens examined was 6696. It is evident, therefore, that hopes may not be wholly vain for a knowledge of the mammals of other continents coordinate with that we now have for North America.

—*W. H. Osgood.*

Hall, Maurice C. THE ADULT TAENIOID CESTODES OF DOGS AND CATS, AND RELATED CARNIVORES IN NORTH AMERICA. Proc. U. S. National Mus., vol. 55, pp. 1–94, April 11, 1919.

This paper includes descriptions of all the adult tapeworms of the superfamily Taenioidea known to occur in dogs, cats, and related carnivores in North America, together with species of the same superfamily not yet recorded as present in North America, but found in other parts of the world, and liable to occur in carnivores in this country. Secondary, as well as primary, hosts are given. Since carnivores seldom prey upon carnivores, but may frequently prey upon other mammals, and since the secondary host must be eaten by the primary host, it follows that most of the secondary hosts belong to other orders of mammals, more particularly to rodents, lagomorphs and ungulates. Of especial interest to mammalogists is the list of both primary and secondary hosts (pp. 79–84) in which are listed species of mammals belonging to twenty-one families, only four of which are carnivores.

—*Hartley H. T. Jackson.*

Davis, John J. CONTRIBUTIONS TO A KNOWLEDGE OF THE NATURAL ENEMIES OF PHYLLOPHAGA. Bull. Illinois State Nat. Hist. Surv., vol. 13, pp. 53–138, pl. 3–15, February, 1919.

The mammalian enemies of the common white grub are discussed on pp. 127–132. The common skunk (*Mephitis*) is considered the most important of these, while the common mole (*Scalopus aquaticus*) is rated second. Among other mammals known to feed on the white grub are the raccoon, coyote, fox, opossum, striped and Franklin's ground squirrels (*Citellus tridecemlineatus* and *C. franklini*), short-tailed shrew (*Blarina brevicauda*), badger and the domestic pig.

—*Hartley H. T. Jackson.*

ALLEN, GLOVER M. The American collared lemmings (*Dicrostonyx*). Bull. Mus. Comp. Zool., vol. 62, no. 13, pp. 509–540; text fig. 1; pl. 1. February, 1919. (Complete revision; one new species, *D. exsul*, from St. Lawrence Island.)

ALLEN, JOEL ASAPH. Nelson's "Wild Animals of North America:" a review. Nat. Hist., vol. 19, no. 3, pp. 330–333. March, 1919.

BAYLIS, H. A. A remarkable *Cysticercus* from a rare dolphin (*Cysticercus tæniæ grimaldii*, Moniez, 1889). Ann. and Mag. Nat. Hist., ser. 9, vol. 3, pp. 417–424. April, 1919. (Record of *Lagenorhynchus acutus* on the Lincolnshire coast.)

CABRERA ANGEL. Dos nuevos antílopes de la subfamilla *Tragelaphinæ*. Bol. Real Soc. española Hist. nat., vol. 18, pp. 274–277. May, 1918. (*Tragelaphus scriptus heterochrous* from west slope of Mt. Elgon; *Limnotragus spekei inornatus* from Northeastern Rhodesia.)

CABRERA ANGEL. Sobre los *Odocoileus* de Colombia. Bol. Real Soc. española Hist. nat. vol. 18, pp. 300–307, pl. 8. June, 1918. (Key to the subspecies of *O. gymnotis*.)

CASTLE, W. E. Siamese, an albinistic color variation in cats. Amer. Nat., vol. 53, p. 265–268. May–June, 1919.

EARNSHAW, FRANK L. See Lawyer and Earnshaw.

FISHERIES SERVICE BULLETIN No. 50. July 1, 1919. (Numbers of skins of fur seals taken on St. Paul and St. George Islands, Bering Sea, p. 5.)

FISHERIES SERVICE BULLETIN No. 51. August 1, 1919. (A shipment of mammal bones from the Pribilof Islands sold in San Francisco; notice of increased seal kill ngs authorized, p. 8)

FISHERIES SERVICE BULLETIN No. 52. September 2, 1919. (Annual 1919, census of fur seals shows increase of 10 per cent over 1918; report of skins taken during season, p. 5.)

GIDLEY, JAMES WILLIAMS. Significance of divergence of the first digit in the primitive mammalian foot. Journ. Washington Acad. Sci., vol. 9, pp. 273–280. May 19, 1919. (Argues against the arboreal ancestry of mammals.)

GIGLIO-TOS, ERMANNO. A proposito del coniglio di Porto Santo e della realtà della specie. Revista Biologia, Roma, vol. 1, fasc. 1, pp. 50–71. 1919.

GIUFFRIDA-RUGGERI, V. La controversia sul fossile di Piltdown e l'origine del philum umano. Monitore Zoologico Italiano, anno xxx, pp. 7–18. 1919. (Agrees with Miller that Piltdown skull and jaw can not belong to mammals of the same family.)

GRAVES, HENRY S., and E. W. NELSON. Our national elk herds; a program for conserving the elk on national forests about the Yellowstone National Park. U. S. Dept. Agric., Dept. Circ. 51, pp. 1–34, figs. 1–19. June, 1919.

GREGORY, WILLIAM K. The evolution of the human face. Nat. Hist., vol. 19, pp. 421–425. April–May, 1919.

GRINNELL, JOSEPH. Five new five-toed kangaroo rats from California. Univ. Calif. Pub. Zool., vol. 21, pp. 43–47. March 29, 1919. (*Perodipus elephantinus*, *P. swarthi*, *P. dixoni*, *P. leucogenys*, *P. monoensis*, new species.)

HARNER, S. F. Report on Cetacea stranded on the British coasts during 1918. Report no. 6, Brit. Mus., London, pp. 1–24, figs. 1–2, pl. 1. March 22, 1919.

HAY, O. P. On some proboscideans of the state of New York. Science, n. s., vol. 49, pp. 377–379. April 18, 1919. (Records of fossil remains of *Elephas* and *Mammut*.)

HAY, O. P. On the relative ages of certain Pleistocene deposits. Amer. Journ. Sci., vol. 47, pp. 361–375. May, 1919.

HAY, O. P. Descriptions of some mammalian and fish remains from Florida of probably Pleistocene age. Proc. U. S. Nat. Mus., vol. 56, pp. 103–112, pls. 26–28. July 31, 1919. (*Thinobadistes*, a new genus of ground sloths, and *Felis veronis* sp. nov.)

HOLLISTER, N. The generic names *Anoa* and *Bubalus*. Proc. Biol. Soc. Washington, vol. 32, p. 45. April 11, 1919. (*Anoa* a valid genus.)

HOLLISTER, N. A new name for the wild sheep of northeastern China. Proc. Biol. Soc. Washington, vol. 32, p. 46. April 11, 1919. (*Ovis comosa* to replace *O. jubata* Peters, preoccupied.)

HOLLISTER, N. What kind of characters distinguish a species from a subdivision of a species. Journ. Washington Acad. Sci., vol. 9, p. 235. April 19, 1919. (From the standpoint of a mammalogist; in a symposium at a meeting of the Biological Society of Washington.)

HORNADAY, WILLIAM T. Report of the Director of the Zoological Park to the Board of Managers. Twenty-third Ann. Report N. Y. Zool. Soc., 1918, pp. 57–80. January, 1919

HOWELL, ARTHUR H. Descriptions of nine new North American pikas. Proc. Biol. Soc. Washington, vol. 32, pp. 105–110. May 20, 1919.

JACKSON, HARTLEY H. T. An unrecognized shrew from Warren Island, Alaska. Proc. Biol. Soc. Washington, vol. 32, pp. 23–24. April 11, 1919. (*Sorex obscurus malitiosus*, subsp. nov.)

LA DUE, H. J. Fur-farming possibilities. Fins, Feathers, and Fur, no. 18, pp. 12–14. June, 1919.

LANG, HERBERT. An okapi reared in captivity. A Belgian woman first to achieve success. Zool. Soc. Bull., N. Y., vol. 22, pp. 71–73, figs. 1–2. July, 1919. (This young animal, captured in Belgian Congo and successfully reared, has since been received at the Zoological Garden in Antwerp.)

LA RUE, CARL D. Monkeys as coconut pickers. Science, n. s., vol. 50, p. 187. August 22, 1919. (*Macaca nemestrina* used for this purpose in Sumatra.)

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THOMAS, OLDFIELD. A new species of *Euneomys* from Patagonia. Ann. and Mag. Nat. Hist., ser. 9, vol. 4, pp. 127–128. September, 1919. (*E. dabbenei* sp. nov. from Santa Cruz.)

THOMAS, OLDFIELD. List of mammals from the highlands of Jujuy, North Argentina, collected by Sr. E. Budin. Ann. and Mag. Nat. Hist., ser. 9, vol. 4, pp. 128–135. September, 1919. (New forms of *Euneomys*, *Hesperomys*, *Eligmodontia*, *Abracoma*, *Lagidium*, and *Galea*.)

THOMAS, OLDFIELD. Two new rodents from Tartagal, Salta, N. Argentina. Ann. and Mag. Nat. Hist., ser. 9, vol. 4, pp. 154–156. September, 1919. (*Akodon tartareus* and *Ctenomys sylvanus*, spp. nov.)

EDITORIAL COMMENT

The American Society of Mammalogists was founded at Washington, D. C., April 3, 1919. After much preliminary work, the committee appointed to consider plans for the organization of such a society issued a call for a meeting on April 3 and 4, 1919, at the National Museum. Over 250 favorable responses were received before April 3, and sixty persons from many parts of the United States and Canada were present for the opening meeting on that day. Plans for the Society were perfected, officers elected, committees formed, and by-laws and rules were adopted. The objects of the Society were declared to be "the promotion of the interests of mammalogy by holding meetings, issuing a serial or other publications, aiding research, and engaging in such other activities as may be deemed expedient." Systematic work, life history and habits of mammals, evolution, palæontology, anatomy, and every phase of technical and popular mammalogy are to come within the scope of the society and its publications. New members and advance subscriptions for the Journal have been steadily received since the organization meeting and the permanent success of the Society and its publications seems assured.

One of the principal objects of the Society is the publication of the Journal of Mammalogy. It is aimed to make this journal indispensible to all workers in every branch of mammalogy and of value to every person interested in mammals, be he systematist, palæontologist, anatomist, museum or zoological

garden man, sportsman, big game hunter, or just plain naturalist. Toward this end the help of each member and friend of the society is urged. General articles on mammals, recent and fossil, are solicited for publication, and authoritative papers on all branches of the study can be used. Papers of general interest on life-histories, distribution, and habits are particularly needed, in order that the Journal may not be overbalanced with purely technical matter. It is comparatively easy to get manuscripts of systematic papers, but those members of the Society who are active in other branches of the study must help if the Journal is to be of interest to all. The departments reserved for General Notes and Correspondence can be made especially interesting. There are hundreds of good "general notes" of value if members will take the time to write them up for publication. The Committee on Publications will gladly receive any suggestions for the improvement of the Journal.

Each member is requested to endeavor to obtain new members for the Society and subscriptions from institutions and libraries where full sets will eventually be needed. Obviously there can be no "free list" for such a publication until it is well on its feet, and the early numbers of biological publications have a way of becoming in a short time excessively rare and difficult to obtain. Take your copy to the authorities in charge of libraries and institutions and urge their subscriptions, to begin with the first number. The fee for Life Membership is seventy-five dollars, and several have been elected to this class.

Members of the Society are indebted to Mr. Ernest Thompson Seton for the drawing of the prong-horn antelope for the front cover decoration. Mr. Seton is an enthusiastic supporter of the new Society, has qualified for Life Membership, and promises some illustrated articles for future numbers of the Journal. He has recently been honored by La Société nationale d'Acclimatation de France for his successful researches in the breeding of fur-bearing animals and has received the Silver Medal. The award was decided upon in 1914, but on account of the war the presentation was postponed. The medal bears the date of 1918, and is the first official French Peace Decoration received by an American since the signing of the armistice. The French authorities see in fur farming an opportunity for crippled soldiers. Mr. Seton's experiments during the past ten years or more have been chiefly with minks, martens, foxes, and skunks.

One of the first acts of the Society after organization, was to elect as an Honorary Member Dr. J. A. Allen, of the American Museum of Natural History, New York. Doctor Allen was the only person elected to this class.

The Annual Meeting of the American Society of Mammalogists for 1920 will be held in New York City at a date to be determined later by the Council.

So many systematic mammalogists believe in the "test of intergradation" as the only criterion for the recognition of subspecies, that some interesting correspondence in the Journal should result from Doctor Merriam's paper in this issue. The opinion in this matter is pretty deeply grounded in the minds of the majority of American workers and is no doubt in a great measure due to the definite stand taken by the committee which framed the original A. O. U. Code of Nomenclature. The remarks of this committee under Canon XI were to the effect that "the kind or quality, not the degree or quantity, of difference of one

organism from another determines its fitness to be named trinomially rather than binomially. . . . . In a word, *intergradation* is the touchstone of trinomialism." The later A. O. U. committee, which prepared the Revised Edition of the Code, accepted these remarks without change, but added that "two kinds of intergradation, however, may be recognized; (1) ordinary or geographic intergradation, and (2) intergradation due to individual variation in forms inhabiting isolated areas." Doctor Merriam is of course right in his statement that intergradation is often assumed rather than proved. But at any rate the author of a revision, by the use of the trinomial, can show that he *believes* that intergradation does take place as indicated; and as he has given the group close study and not infrequently has examined a very large amount of material, his opinion on the matter would seem to have a certain definite value to others.

—N. H.

AMERICAN SOCIETY OF MAMMALOGISTS

By-Laws and Rules Adopted April 3, 1919

BY-LAWS

Article I. Name and Objects

Sec. 1. This society shall be known as the American Society of Mammalogists.

Sec. 2. The object of the Society shall be the promotion of the interests of mammalogy by holding meetings, issuing a serial or other publications, aiding research, and engaging in such other activities as may be deemed expedient.

Article II. Membership

Sec. 1. The Society shall consist of members, honorary members, and patrons.

Sec. 2. Any person may become a member of the Society upon recommendation of two members and election at the next annual stated meeting, or by special election at other times by a two-thirds vote of the Council, each Councilor having been given thirty days notice. A member is entitled to vote for all officers and to receive the serial publication of the Society.

Sec. 3. Honorary members shall be elected by a majority vote of the Society upon unanimous recommendation of the Council in recognition of distinguished services to mammalogy. They shall be exempt from all dues and shall be entitled to all privileges of members except that they shall not be eligible to office or to membership on the Council.

Sec. 4. Any person upon payment of one thousand dollars to the Society may, upon recommendation of the Council, be elected a patron and shall be entitled to all the pr vileges of a member, shall receive all publications of the Society, and shall be exempt from membership fees.

Article III. Officers

Sec. 1. The officers of the Society shall be a President, two Vice-Presidents, a Recording Secretary, a Corresponding Secretary, and a Treasurer. These, together with the Editor and ten persons elected from the Society at large, shall constitute the Council or Board of Managers of the Society.

Sec. 2. The officers of the Society shall be elected annually and shall be eligible for reelection; and such officers shall perform their duties until their successors shall qualify. The Editor shall be appointed by the Council. Five members of the Council shall be elected annually from the Society at large and shall serve for two years. Officers shall be elected by a majority vote at the annual meeting, and their official term shall commence at the close of the meeting at which they are elected.

Sec. 3. Vacancies among the officers or in the Council may be filled temporarily by appointment by the Council; but persons so appointed shall hold office only until the next meeting of the Society.

Article IV. Meetings

Sec. 1. An annual stated meeting shall be held in accordance with the action of the Society at the preceding annual meeting. The Corresponding Secretary shall give due notice of such meetings.

Sec 2. A special meeting of the Society may be called at any time by order of the Council, provided that notice of the purpose of the meeting has been given at least thirty days in advance.

Sec. 3. Sections of the Society may be organized by five or more members in any locality, with the approval of the Council of the Society in each case, for the purpose of holding meetings for the presentation of papers or discussion. Sections may have their own officers and rules, but such rules shall not conflict with the By-laws or Rules of the Society. Each section shall present to the Society an annual report of its activities.

Article V. Quorum

Twenty-five shall constitute a quorum of the Society and five a quorum of the Council.

Article VI. Amendments

Amendments to these By-laws, recommended by the Council, may be adopted at any annual stated meeting by a two-thirds vote of the members present, provided that notice of each proposed amendment has been sent to each member two months before the meeting.

Article VII. Rules

Upon recommendation of the Council, Rules may be adopted, amended, or repealed at any annual stated meeting by a majority vote.

Article VIII. Fees and Accounts

Sec. 1. Annual dues for members shall be three dollars payable in advance.

Sec. 2. Any member upon payment of seventy-five dollars to the Society at any one time shall be entitled to life membership, and shall be exempt from membership dues.

Sec. 3. All moneys received from life members and patrons in consideration of their election as such, and all gifts for undesignated purposes, shall be invested as a permanent fund, the income of which may be used for special purposes as directed by a three-fourths vote of the Council.

Sec. 4. The accounts of the Treasurer shall be audited as directed by the Council at the close of each year before presentation at the annual stated meeting of the Society.

RULES

Rule I. Election of Officers

The election of officers shall be conducted as follows:

Nominations shall be made in each case by an informal ballot, and the result announced by the Secretary, after which the first formal ballot shall be taken.

In balloting for Vice-Presidents and the five additional members of the Council, each member shall write on one ballot as many names as there are officers to elect, namely, two on the first ballot for Vice-Presidents and five on the first ballot for members of the Council; and on each subsequent ballot as many names as there are officers still to be elected. Those persons who receive a majority of the votes cast shall be declared elected, providing that the number of persons receiving a majority does not exceed the number of persons to be elected, in which case the vacancies shall be filled by the candidates receiving the highest majorities.

If in any case the informal ballot result in giving a majority for one or more of the persons balloted for, it may be declared formal by a majority vote.

Rule II. Order of Business

The order of business at the annual stated meeting unless changed by a two-thirds vote of members present shall be as follows:

1. Reading and approval of the minutes of the previous meeting.
2. Report of the Recording Secretary.
3. Report of the Corresponding Secretary.
4. Report of the Treasurer.
5. Election of members.
6. Election of officers and members of the Council.
7. Appointment of committees.
8. Report and recommendations of the Council.
9. Action on business reported from the Council.
10. Consideration of amendments to By-laws and Rules.
11. Reports of committees.
12. New and unfinished business.
13. Reading of minutes of the meeting.